Delaware Redesignation Request and Maintenance Plan Under the 2006 Daily $PM_{2.5}$ National Ambient Air Quality Standard

State Implementation Plan

For the New Castle County Portion of the

Philadelphia-Wilmington, PA-NJ-DE Nonattainment Area for Fine Particles

PROPOSED

October 23, 2012

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Acronym List

AQS	-	EPA's Air Quality System
BYR	-	Base Year
CAA	-	Federal Clean Air Act
CAAA	-	Clean Air Act Amendments of 1990
CFR	-	Code of Federal Regulations (of the United States)
CSAPR	-	Cross-State Air Pollution Rule
DAQ	-	DNREC Division of Air Quality
DelDOT	-	Delaware Department of Transportation
DNREC	-	Delaware Department of Natural Resources and Environmental Control
EGU	-	Electric Generating Unit
GDP	-	Gross Domestic Product
EPA	-	United States Environmental Protection Agency
FYR	-	Future Year
FHWA	-	Federal Highway Administration
FR	-	United States Federal Register
FRM	-	Federal Reference Method
FTA	-	Federal Transit Authority
I/M	-	Inspection and Maintenance Program
MANEVU	-	Mid-Atlantic and Northeast Visibility Union
MARAMA	-	Mid-Atlantic Regional Air Management Association
NESCAUM	-	Northeast States for Coordinated Air Use Management
LRTP	-	Long Range Transportation Plan
MLK	-	Martin Luther King Blvd. monitor in Wilmington, Delaware
MPO	-	Metropolitan Planning Organization
mmBTU	-	Million British Thermal Unit
NAA	-	Non-Attainment Area
NAAQS	-	National Ambient Air Quality Standard
NEI	-	National Emission Inventory
NOx	-	Oxides of Nitrogen
NAA	-	Non-attainment area
$PM_{2.5}$	-	Particulate Matter with an aerodynamic diameter of 2.5 microns or less
RACM	-	Reasonably Available Control Measure
RACT	-	Reasonably Available Control Technology
RPO	-	Regional Planning Organization
SIP	-	State Implementation Plan
(SAFETEA-LU)	-	Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users
SO_2	-	Sulfur Dioxide
TIP	-	Transportation Improvement Program
tpy	-	Tons per Year
TSD	-	Technical Supporting Document
VOC	-	Volatile Organic Compound
WILMAPCO	-	Wilmington Area Planning Council

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EXECUTIVE SUMMARY

This request for redesignation to attainment and maintenance plan is a State Implementation Plan (SIP) revision for the Delaware portion[1] of the Philadelphia-Wilmington, PA-NJ-DE fine particulate matter ($PM_{2.5}$) nonattainment area (Philadelphia NAA).

On November 13, 2009, EPA published the area designations for the 2006 24-hour standard (74 FR 58688). That action, effective on December 14, 2009, designated the Philadelphia NAA as nonattainment for the 2006 24-hour standard, based on 2006-2008 monitoring data. The Philadelphia NAA includes New Castle County in Delaware; Burlington, Camden, and Gloucester Counties in New Jersey; and Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania. CAA Section 107 establishes specific requirements to be met in order for a nonattainment area to be considered for redesignation. This redesignation request and maintenance plan SIP revision addresses all of the CAA Section 107 requirements, and provides technical information that supports a request to redesignate the Philadelphia NAA area to attainment of the 2006 daily $PM_{2.5}$ NAAQS.

$PM_{2.5}$ air quality has improved in New Castle County as a result of the implementation of State and Federal emissions control measures. The air quality improvement is due to permanent and enforceable emissions control measures. The entire Philadelphia NAA has certified and quality assured ambient air quality monitoring data for the 3-year periods 2008-2010 and 2009-2011 that all demonstrates attainment of the 2006 $PM_{2.5}$ NAAQS. The purpose of this redesignation request and maintenance plan is to request that the United States Environmental Protection Agency (EPA) redesignate the Delaware portion of the Philadelphia NAA to attainment for this standard pursuant to the provisions of Section 107 of the federal Clean Air Act (CAA) (42 U.S.C. 7407). In summary, the plan includes:

- A demonstration that attainment of the 2006 $PM_{2.5}$ air quality standards for the Philadelphia NAA will continue through 2025.
- An attainment emissions inventory that identifies the level of emissions in the area that is sufficient to attain the NAAQS and projected future emissions inventories showing that future emissions in the area will not exceed the level of the attainment inventory over the 10-year maintenance period.
- Contingency measures to be implemented in the unlikely event of a subsequent violation of the air quality standard. The contingency measures listed in the Plan will be triggered to expeditiously correct any future exceedances.
- On-road motor vehicle emissions budgets for 2017 and 2025 for use in transportation conformity determinations to assure that any increases in emissions from this sector do not jeopardize continued attainment of the 2006 daily $PM_{2.5}$ standards during the maintenance period.

[1] Pennsylvania and New Jersey Departments of Environmental Protection are responsible for developing similar plans for their portion of the Philadelphia NAA.

Based on this presentation, New Castle County, Delaware meets the requirements for redesignation under the CAA (Section 107(d)(3)) and EPA guidance for fine particles. Consistent with the authority granted to EPA, the State of Delaware requests that New Castle County, Delaware be redesignated to attainment for the 2006 daily fine particles standard simultaneously with EPA approval of this Delaware State redesignation request and $PM_{2.5}$ Maintenance Plan for the New Castle County portion of the Philadelphia NAA.

1 Introduction

The State of Delaware requests that the EPA redesignate the Delaware portion of Philadelphia NAA to attainment for the 2006 daily $PM_{2.5}$ NAAQS pursuant to the provisions Section 107 of the CAA (42 U.S.C. 7407).[2] Since the designations for the 2006 NAAQS for this pollutant were published, the area's $PM_{2.5}$ air quality has improved due to permanent and enforceable emission reductions. Air quality in the area is significantly better than required by this standard. This document demonstrates that $PM_{2.5}$ air quality in the Philadelphia area will remain compliant with the 2006 daily $PM_{2.5}$ NAAQS, as measured by a monitoring network that meets all federal requirements, through 2025.

Delaware is also requesting that EPA concurrently approve, as a revision to the Delaware state implementation plan (SIP), the related Section 175A maintenance plan, as described in Sections 6-8 of this document. This plan includes mobile vehicle emissions budgets for the interim year of 2017 and the out year of 2025. It also contains contingency measures that will be implemented in the unlikely event that the area experiences an exceedance of the 2006 $PM_{2.5}$ NAAQS. The maintenance plan ensures that good $PM_{2.5}$ air quality will be maintained through 2025.

1.1 Documentation Organization

This document presents Delaware's discussions and analysis of summarized air quality data and emission inventories, $PM_{2.5}$ control measures and applicable CAA and EPA requirements in support of Delaware's request for redesignation to attainment under the 2006 daily $PM_{2.5}$ NAAQS. Supporting documentation and data, such as Technical Support Documents (TSD), calculation spreadsheets, model input and output files, and other related data are available on the CD enclosed with this redesignation request and maintenance plan. Much of the documentation that is referenced in the report, but not contained on the CD, has been compiled in electronic files located at the Division of Air Quality offices in Dover, Delaware and are available for review upon request by the public.

2 Background

2.1 Health Effects

$PM_{2.5}$, also known as fine particulate matter or fine particles, is defined as any airborne particle of solid or liquid matter that is less than or equal to 2.5 micrometers in diameter. $PM_{2.5}$ is not a single pollutant, but is a sum of all pollutants that have diameters less than 2.5 micrometers. For reference, 2.5 micrometers is about 1/30th the diameter of a human hair.

Sources of $PM_{2.5}$ and $PM_{2.5}$ precursors include, most significantly, coal-fired power plants and other combustion sources, fires, emissions from motor vehicles, windblown dust, and natural emissions from trees and the oceans. These sources can be divided up into two types of

[2] After EPA redesignates the Philadelphia nonattainment area to attainment, it will be known as the Philadelphia Maintenance Area, or Philadelphia MA

sources, primary and secondary. Primary sources directly emit fine particulate matter into the atmosphere without any chemical change occurring to the pollutant. Secondary sources are sources from which precursor chemical species are released into the atmosphere, which then react with other chemical species in the atmosphere to create fine particulate matter. Some species which comprise fine particulate matter are sulfates, ammonium nitrate, soot, sea salt, organic carbon, elemental carbon and metals (crustal metals, transitional metals, and potassium).

Exposure to high levels of $PM_{2.5}$ adversely affects human health. The main impacts of $PM_{2.5}$ on human health are on the respiratory system and the cardiovascular system. Children, the elderly, and individuals with pre-existing pulmonary or cardiac disease are the most susceptible to $PM_{2.5}$ pollution. Complications that can arise from exposure to $PM_{2.5}$ include decreased lung function, chronic bronchitis; respiratory symptoms such as asthma attacks and difficulty breathing, nonfatal heart attacks, irregular heartbeat, and premature death in individuals with pulmonary or cardiac disease.

2.2 Philadelphia-Wilmington, PA-NJ-DE Nonattainment Area Designation

Following promulgation of a new or revised NAAQS, EPA is required by the CAA to designate areas throughout the United States as attaining or not attaining the NAAQS; this designation process is described in Section 107(d)(1) of the CAA. On October 17, 2006, EPA retained the 1997 annual $PM_{2.5}$ NAAQS at 15 $\mu g/m^3$ based on a 3-year average of annual mean $PM_{2.5}$ concentrations, and promulgated a 24-hour standard of 35 $\mu g/m^3$ based on a 3-year average of the 98th percentile of 24-hour concentrations (71 FR 61144), also known as the 2006 24-hr NAAQS.[3]

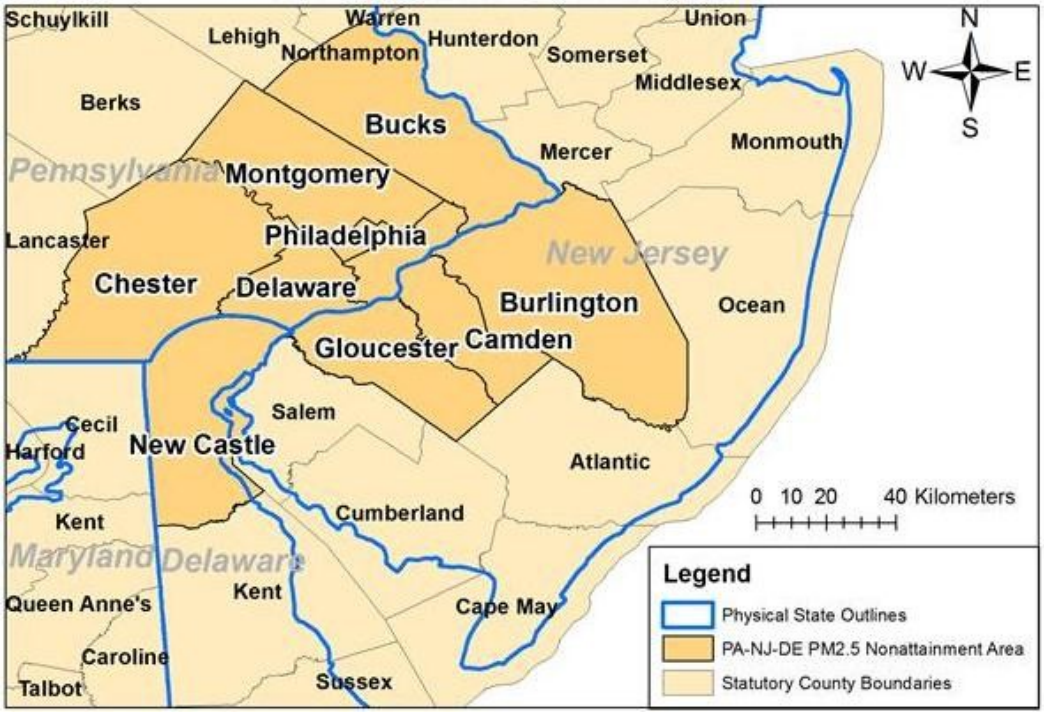
On November 13, 2009, EPA published the area designations for the 2006 24-hour standard (74 FR 58688). That action, effective on December 14, 2009, designated the same Philadelphia Area as nonattainment for the 2006 24-hour standard, based on 2006-2008 monitoring data. The Philadelphia Area includes New Castle County in Delaware; Burlington, Camden, and Gloucester Counties in New Jersey; and Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania (see Figure 2-1).

CAA Title I, Part D, Subpart 1 sets forth the basic nonattainment requirements applicable to all nonattainment areas. For the 2006 $PM_{2.5}$ daily NAAQS, these requirements are required to be met by December 14, 2012. However, as stipulated in 40 CFR 51.1004(c), a "clean data determination" (CDD) by the EPA suspends the requirements to submit an attainment demonstration and associated reasonably available control measures (RACM) (CAA Section 172(c)(1) and (c)(6)), reasonable further progress (RFP) requirements (CAA Section 172(c)(2)), contingency measures (CAA Section 172(c)(9)), and other planning SIP elements related to attainment for so long as the area continues to attain the NAAQS. EPA informed Delaware

[3] The terms "24-hr" and daily are used interchangeably throughout this document.

Division of Air Quality (DAQ) staff, that they expect the CDD Rulemaking to be proposed in the Federal Register by December 14, 2012.[4]

Figure 2-1 Philadelphia Nonattainment Area Boundaries - 2006 $PM_{2.5}$ NAAQS



3 EPA Requirements for Redesignation

Section 107(d)(3)(E) of the CAA allows states to request nonattainment areas to be redesignated to attainment provided certain criteria are met. The criteria for redesignating a nonattainment area to attainment are as follows:

- EPA has determined that the area attained the NAAQS. For the 2006 $PM_{2.5}$ NAAQS, the areas must show that the 3-year average of the 98th percentile of 24-hour concentrations from three (3) consecutive calendar years of quality-assured air quality monitoring data is 35 µg/m^3, or lower (71 FR 61144).

- The request must contain a showing that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from the implementation of the applicable SIP.

- The applicable implementation plan must be fully approved by EPA under Section 110(k) of the CAA, and the redesignation request must contain a determination that the state meets all applicable requirements for the area under Section 110 and Part D.

[4] M. Pino, EPA Region 3 (August 14, 2012).

- A fully approved maintenance plan, including contingency measures, for the area under Section 175A of the Act. Section 175A requires demonstrating that the area will maintain (continue to attain) the standard for at least ten years after redesignation to attainment, and that contingency measures be implemented if a violation is monitored at any time during the ten-year maintenance period.

This document addresses each of these requirements. EPA has published applicable guidance in a memorandum from John Calcagni, Director, Air Quality Management Division, entitled *Procedures for Processing Requests to Redesignate Areas to Attainment* (redesignation guidance), issued September 4, 1992, to Regional Air Directors. 40 CFR Part 51, Subpart Z, entitled *Provisions for Implementation of $PM_{2.5}$ National Ambient Air Quality Standards* (implementation rule) provides additional information. The State of Delaware has based this redesignation request and maintenance plan on the redesignation guidance and the implementation rule, supplemented with additional guidance received through coordination with EPA Region 3 staff.

3.1 NAAQS Compliance

3.1.1 EPA Requirements

CAA Section 107(d)(3)(E)(i) addresses attaining the standard. This Section states that the demonstration should rely upon ambient air quality data. The data that are used to demonstrate attainment should be the product of ambient monitoring that is representative of the area of highest concentration. Additionally, the data should be collected and quality-assured in accordance with 40 CFR Part 58 and recorded in the Air Quality System (AQS) in order for it to be available to the public for review.

3.1.2 Delaware Approach

EPA's published guidance document, *Procedures for Processing Requests to Redesignate Areas to Attainment* (September 4, 1992), which details specific requirements regarding the collection and use of ambient air monitoring data needed to support a redesignation request. Before the Philadelphia NAA can be redesignated to attainment for the 2006 daily $PM_{2.5}$ NAAQS, the City of Philadelphia, Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Air Quality (DAQ), the New Jersey Department of Environmental Protection and the Pennsylvania Department of Environmental Quality must each demonstrate that the daily $PM_{2.5}$ NAAQS has been attained in their respective jurisdictions of the Philadelphia NAA. $PM_{2.5}$ monitoring data must show that violations of the NAAQS are no longer occurring within the NAA.

This showing must rely on three complete, consecutive calendar years of quality assured data. Further, the air monitoring data must be quality assured in accordance with 40 CFR 58.10, recorded in EPA's Air Quality System (AQS) database, and made available to the public. Finally, Delaware DAQ must commit to continue to operate an appropriate monitoring network

to verify the maintenance of the attainment status, once the area has been redesignated to attainment. Taken together there are three primary requirements:

1) A demonstration that the NAAQS for daily $PM_{2.5}$, as published in 40 CFR 50.13, has been attained.

2) Ambient monitoring data quality assured in accordance with 40 CFR 58.10, recorded in the EPA air quality system (AQS) database, and available for public view.

3) A commitment that once redesignated, the state will continue to operate an appropriate monitoring network to verify the maintenance of the attainment status.

3.2 Demonstration that the NAAQS for daily $PM_{2.5}$, as published in 40 CFR 50.13, has been attained (requirement 1 of 3)

The City of Philadelphia, and the States of Delaware and New Jersey, and the Commonwealth of Pennsylvania, (''the States'') submitted quality assured air quality monitoring data into the EPA Air Quality System (AQS) database for the 2008–2010 and 2009-2011 monitoring periods. The States then certified that data. The criteria for determining if an area is attaining the 2006 daily $PM_{2.5}$ NAAQS are set out in 40 CFR 50 and appendix N. The 24-hour primary and secondary $PM_{2.5}$ standards are met when the 98th percentile 24-hour concentration is less than or equal to 35 $\mu g/m^3$. Three years of valid daily means are required to produce a valid daily standard design value. A year meets data completeness requirements when at least 75 percent of the scheduled sampling days for each quarter have valid data. The use of less than complete data is subject to the approval of EPA, which may consider factors such as monitoring site closures/moves, monitoring diligence, and nearby concentrations in determining whether to use such data.

While most of the monitoring data submitted by the States was complete, several monitors in the Philadelphia NAA had less than four quarters of complete data for one or more years during the 2008–2010 and 2009-2011 monitoring periods. For these monitors, EPA applied the data substitution test set out in the April 1999 EPA guidance document ''*Guideline on Data Handling Conventions for the PM NAAQS*". The ''maximum quarter'' substitution test (Max-Q) identified in the guidance document is used for monitors with missing data. Maximum recorded values are substituted for the missing data. The resulting design value is compared to the standard. The monitor passes if the design value with maximum values substituted meets the standard. If the monitor does not pass using the Max-Q Sub test, then another statistical method was required. The statistical method used to determine whether an incomplete monitor would have met the NAAQS, is to first establish a linear regression relationship between the target monitor and another monitor in or close to the nonattainment area. The linear regression would then be used to fill in the missing data for the target monitor. The results are checked with an additional statistical procedure ("bootstrapping") to give a "diagnostic" design value verifying if the conclusion of attainment is correct.

2008-2010 data

The Max-Q test could not be used to show attainment, considering 2008–2010 data, for one monitor located in Chester County, Pennsylvania ("New Garden" monitor: ID 420290100). For this monitor, EPA performed a linear regression between the site with incomplete data and a nearby site ("Newark" monitor: ID 100031012), which has more complete data in the period in which the incomplete site is missing data. The equation developed from the relationship between the monitors was used to fill in missing data for the New Garden monitor, so that the normal data completeness requirement of 75 percent of data in each quarter of the three years was met. After the missing data for the site was filled in, the results were verified through bootstrapping. The results of EPA's statistical analysis indicated that while the Chester County, Pennsylvania monitor had less than complete data, the data is sufficient to demonstrate that the NAAQS has been met for 2008-2010 design values. Therefore, all monitors in the Philadelphia NAA meet the 2006 daily $PM_{2.5}$ NAAQS based on certified, quality assured and complete 2008-2010 monitoring data.

2009-2011 data

Although the Philadelphia NAA initially came into attainment considering 2008-2010, this redesignation request is being submitted in late 2012. Therefore, more recent monitoring data is available (e.g., 2011 and preliminary 2012). However, the Philadelphia Area had three incomplete monitors for 2009-2011.[5] Monitoring site 42-101-0024 was shutdown on Jan 2011, and site 42-101-1002 started operating in January 2011. EPA applied linear regression analysis, followed by bootstrap runs for the third incomplete monitor: the New Garden monitor at site 42-029-0100 located in Chester, PA, which had missing data due to power failures in 2011. The results of EPA's analysis show that the "diagnostic design value" computed from EPA's statistical procedure is 33 $\mu g/m^3$ for the New Garden monitor.[6,7] EPA's analysis may be found in this Plan's supporting documentation, "*B2- Statistical Results for 2009-2011 Design Values*".

Summary

As shown in Table 3-1, the highest 3-year design value for the daily NAAQS, based on 2008-2010 and 2009-2011 data is 33 $\mu g/m^3$, which is less than the level of the daily $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$. In addition, preliminary 2012 data from AQS, the 1st quarter values continue to show attainment with the highest value of 35 $\mu g/m^3$ ("Bucks County": monitor ID 420170012). Therefore, certified and quality-assured ambient air quality monitoring data demonstrates that the air quality has met the 2006 NAAQS for daily $PM_{2.5}$ in the Philadelphia NAA for the 2008-2010, and 2009-2011 timeframes. The 2006 daily $PM_{2.5}$ NAAQS attainment, accompanied by decreases in emission levels discussed in Section 3.3.1, supports a redesignation to attainment for the New Castle County, Delaware portion of the Philadelphia NAA based on the requirements in Section 107(d)(3)(E) of the CAA as amended.

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5 As of July, 2012 the 2011 AQS monitoring data showed one quarter of missing data for each of the following monitor sites: Newark, ID 100031012, Bellefonte, ID 100031003 and New Garden, ID 420290100. Delaware's incomplete 2011 data has since been deemed valid because it passed the Max Q test.

6 E. V. Rosa, EPA Region 3 (August 27, 2012).

7 Chester County PA monitor had incomplete data in 2011. However, the EPA " Statistical Results for Computation of 2009-2011 Diagnostic 24-hour $PM_{2.5}$ Design Values of Monitoring Site 42-029-0100 in the Philadelphia-Wilmington Nonattainment Area" demonstrates 2009-2011 "Clean Data" for the Philadelphia NAA.

Table 3-1 Philadelphia NAA 98th percentiles and Design Values (2008-2011)

			98th Percentile Value[1]					2008-2010 Design Value	2008-2010 Status [2]	2009-2011 Design Value	2009-2011 Status [2]
State	County	Monitor ID	2008	2009	2010	2011	Pre-Lim. 2012[6]				
DE	Bellefonte	100031003	28.0	23.2	24.3	22.4*	17.5	25	C	23	Max-Q
	Lums	100031007	23.9	20.6*	27.5	21.0	21.8	22	C	23	Max-Q
	Newark	100031012	31.6	23.4	24.9	22.2*	20.2	26	Max-Q	24	Max-Q
	MLK	100032004	28.1	28.4	27.9	24.7	22.7	25	Max-Q	27	C
NJ	Camden	340071007	28.6	25.0	23.4	24.3	22.0	26	C	24	C
	Gloucester	340150004	34.8	21.9	21.6*	22.2	23.9	30	C	22	Max-Q
PA	Bucks	420170012	30.9	25.8	28.3	29.7	34.9	28	C	28	C
	Chester	420290100	32.0	31.1	35.1	33.8*	21.0	33	Bootstrap	33	Inc. (3)
	Delaware	420450002	28.6	27.9	32.8	28.6	23.9	30	C	30	C
	Montgomery	420910013	23.7	27.2	25.9	27.6	21.1	26	C	27	C
	Philadelphia	421010004	34.5	25.9	27.6	29.6	27.9	29	C	28	C
	Philadelphia	421010024	30.5	25.5	25.2	-	-	27	C	25	Inc. (4)
	Philadelphia	421010047	32.8	27.2	27.6	27.5	20.0	29	C	27	C
	Philadelphia	421010055	34.5	28.6	28.9	30.6	19.6	31	C	29	C
	Philadelphia	421010057	32.8	28.3	27.9	30.5	20.6	30	C	29	C
	Philadelphia	421011002	-	-	-	27.5	23.4	NA	NA	27	Inc. (5)
NAA Avg. (all monitors)			**30.4**	**26.0**	**27.3**	**26.8**	**22.7**	**27.8**		**26.6**	**30.4**

NOTES:

2009-2011 data source: E. V. Rosa, EPA Region 3 (August 27, 2012).
2008 data source: EPA AQS (as of July, 2012).

1. Yearly 98th percentile values initially not meeting the completeness criteria are marked with an asterisk (*). The dash (-) indicates that no data was collected during this time.
2. This column indicates whether the monitoring data from the monitor meet the completeness requirement (C) or not (Inc.) for each quarter of the 3-year period. "Max-Q" denotes that the monitor has incomplete data, but passed the maximum quarter substitution test.
3. "EPA only applied its statistical procedure (a.k.a. bootstrapping) for the 2011 third incomplete monitor for: the New Garden monitor (420290100 located in Chester, PA, which had missing data due to power failures in 2011. ***The "diagnostic" design value computed from EPA's procedure was 33 µg/m^3"*,** (see footnote 6).
4. Monitoring site was shut down on January 1, 2011.
5. Monitoring site commenced operation on June 1, 2010.
6. Preliminary 2012 data is 1st quarter only, obtained from AQS in July, 2012.

3.3 Ambient monitoring data quality assured in accordance with 40 CFR 58.10, recorded in the EPA air quality system (AQS) database, and available for public view (requirement 2 of 3)

Delaware DAQ has quality assured all data in accordance with 40 CFR 58.10 and all other federal requirements. Delaware DAQ has recorded the data in the AQS database and, therefore, the data are available to the public.

Delaware began official $PM_{2.5}$ monitoring in 1999. Delaware's $PM_{2.5}$ network consists of seven (7) monitoring sites, one of which employs a collocated monitor. There are four (4) sites in New Castle County, two (2) in Kent County and one (1) in Sussex County. Table 3-2 lists the $PM_{2.5}$ sites in New Castle County (the only nonattainment county), including the nature of the area, and general site descriptions. Table 3-3 contains more specific information for each $PM_{2.5}$ monitoring site in New Castle County.

Table 3-2 $PM_{2.5}$ Monitoring Site General Information

Site Name & AQS ID	Land Use	Setting	Metropolitan Statistical Area
Bellefonte 10-003-1003	Residential	Suburban	Philadelphia - Wilmington
MLK 10-003-2004	Commercial	Urban	Philadelphia - Wilmington
Newark 10-003-1012	Residential	Suburban	Philadelphia - Wilmington
Lums Pond 10-003-1007	Agricultural	Rural	Philadelphia - Wilmington

Table 3-3 $PM_{2.5}$ Monitor Site Specific Information

Site Name & AQS ID	Parameter	Start Date	Objective
Bellefonte 10-003-1003	$PM_{2.5}$	1/1/1999	Population Exposure, Attainment Status
MLK 10-003-2004	$PM_{2.5}$	1/1/1999	Maximum concentration, Attainment Status
	$PM_{2.5}$ speciation	6/1/2001	$PM_{2.5}$ Characterization
	Black Carbon	1/1/2001	Diesel $PM_{2.5}$ Indicator
Newark 10-003-1012	$PM_{2.5}$	12/15/1999	Population Exposure, Attainment Status
Lums Pond 10-003-1007	$PM_{2.5}$	1/1/1999	Transport/Background, Attainment Status

The primary goal of the $PM_{2.5}$ monitoring network in Delaware is to determine the status of the ambient air with respect to the 24-hour and annual average $PM_{2.5}$ NAAQS. In accordance with federal regulations, state agencies must operate at least the minimum number of required $PM_{2.5}$ sites listed in 40 CFR Part 58 Appendix D Table D-5. These required monitoring stations or sites must be sited to represent community-wide air quality. In addition, the following specific criteria also apply:

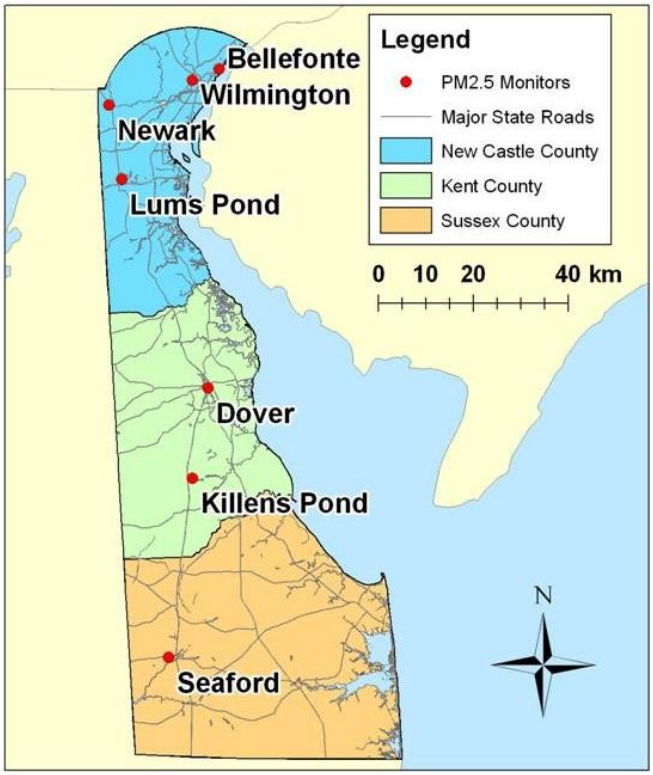
1) At least one monitoring station is to be sited in a population-oriented area of expected maximum concentration.
2) For areas with more than one required station, a monitoring station is to be sited in an area of poor air quality.
3) Each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor regional transport.

Figure 3-1 shows the locations of Delaware's $PM_{2.5}$ monitors. All data from these monitors are measured using EPA approved federal reference methods (FRM). All $PM_{2.5}$ monitoring sites are located appropriately and are eligible for comparison to the annual and daily $PM_{2.5}$ NAAQS.

The standard monitoring schedule is one in three days, with one site (MLK-Wilmington) monitoring every day. MLK is also the designated collocated site, with the collocated monitor designated as MLK-b operating on a one in six day schedule. All data were submitted to EPA's Air Quality System (AQS) in a timely manner in accordance with the schedule prescribed by EPA.

Chemical speciation is encouraged at sites where the chemically resolved data would be useful in developing SIPs and supporting atmospheric or health effects related studies. Chemical speciation is conducted at MLK in Wilmington and Dover in Kent County. The $PM_{2.5}$ chemical speciation sites include analysis for elements, selected anions and cations, and carbon.

Figure 3-1 Delaware's $PM_{2.5}$ Monitoring Site Locations



Delaware's original $PM_{2.5}$ monitoring network design and monitor siting were completed in accordance with EPA requirements and guidance as stated in 40 CFR Part 58 Appendices D and E, and the EPA Office of Air Quality Planning & Standards (OAQPS) document *"Guidance for Network Design and Optimum Site Exposure for $PM_{2.5}$ and PM_{10}"* (EPA 1997a). Final network documents were submitted to EPA Region 3 in June 1998, and EPA approved Delaware's $PM_{2.5}$ monitoring network.

Delaware Annual Ambient Air Monitoring Network Reviews, including $PM_{2.5}$, have been completed each year in accordance with 40 CFR Part 58 Appendix D and subsequently submitted to EPA Region 3 for approval.

In fulfillment of the federal 103 grant requirements, Delaware submits annual *Delaware Data Quality Assessments* for $PM_{2.5}$ speciation data and $PM_{2.5}$ FRM data to EPA Region 3. All data comply with appropriate federal and state requirements, including 40 CFR Part 50 Appendices L and N, and 40 CFR Part 58 Appendix A.

In fulfillment of the federal 103 grant requirements, Delaware also submits annual $PM_{2.5}$ Speciation Monitoring Network Review and Monitoring Strategy reports to EPA Region 3. The $PM_{2.5}$ speciation network design and monitor siting follows EPA requirements and guidance as stated in 40 CFR Part 58 Appendices D and E, and the documents "*Guidance for Network Design and Optimum Site Exposure for $PM_{2.5}$ and PM_{10}*" (EPA 1997a), "*Particulate Matter*

($PM_{2.5}$) Speciation Guidance" (EPA 1999), and "*Guideline on Speciated Particulate Monitoring*" (EPA 1999a).

3.4 A commitment that once redesignated, the state will continue to operate an appropriate monitoring network to verify the maintenance of the attainment status (requirement 3 of 3)

3.4.1 EPA Requirements

Once an area has been redesignated, the states must continue to operate an appropriate air quality monitoring network in accordance with 40 CFR Part 58, to verify the area's attainment status. In cases where measured mobile source parameters (for example, vehicle miles traveled) have changed over time, a state may also need to perform a saturation monitoring study to determine the need for, and location of, additional permanent monitors.

3.4.2 Delaware Approach

The State of Delaware operates a monitoring network that is significantly more robust than required by federal regulation. New Castle County is nonattainment for the 1997 $PM_{2.5}$ annual standard and the 2006 daily $PM_{2.5}$ standard. Accordingly, Delaware is required to maintain its current monitoring network.

As mentioned in above, states must continue to operate an appropriate air quality monitoring network in accordance with 40 CFR Part 58, to verify the area's attainment status. Information on Delaware's monitoring network was discussed in Section 3.3.

The State of Delaware commits to operating and maintaining an air quality network for $PM_{2.5}$ monitoring that meets all federal requirements. However, should changes become necessary in the future Delaware DAQ will consult with EPA Region 3 prior to making changes to the existing monitoring network. Delaware DAQ will continue to quality assure the monitoring data to meet the requirements of 40 CFR 58 and all other federal requirements. Delaware DAQ will enter all data into AQS on a timely basis in accordance with federal guidelines.

4 Permanent and Enforceable Emission Reductions

4.1 U. S. EPA Requirements

As noted in Section 107(d)(3)(E)(iii) and in the redesignation guidance, states must be able to reasonably attribute its air quality improvements to emission reductions of precursors or direct $PM_{2.5}$ that are permanent and enforceable. Attainment resulting from temporary reductions in emission rates (such as reduced production or shutdown due to temporary adverse economic conditions) or unusually favorable meteorological conditions does not qualify.

4.2 Delaware Approach

Delaware will demonstrate the improvement in air quality described in 3.2 of this document was not a result of temporary adverse economic conditions (4.2.1) or unusually favorable meteorology (4.2.2). Delaware then demonstrates that the improvements in air quality described in 3.2 of this document are reasonably attributable to permanent and enforceable emission reductions of direct $PM_{2.5}$ and $PM_{2.5}$ precursors (4.2.3 and 4.3).

4.2.1 Economic Conditions

Delaware evaluated the role economic conditions may have played in the improvement in air quality described in 3.2 of this document by evaluating the Gross Domestic Product (GDP) growth rate. The GDP growth rate is an indicator of economic health. If the GDP growth rate is increasing, it is an indication that the activity of emitting sources are increasing. Conversely, if the GDP is declining it is an indication that the activity of emitting sources may be reduced because of economic conditions.

Delaware specific GDP for all industries, obtained from the U.S. Bureau of Economic Analysis (BEA), is presented in Figure 4-1.

Figure 4-1 2006 – 2011 Delaware Gross Domestic Product – All Industry

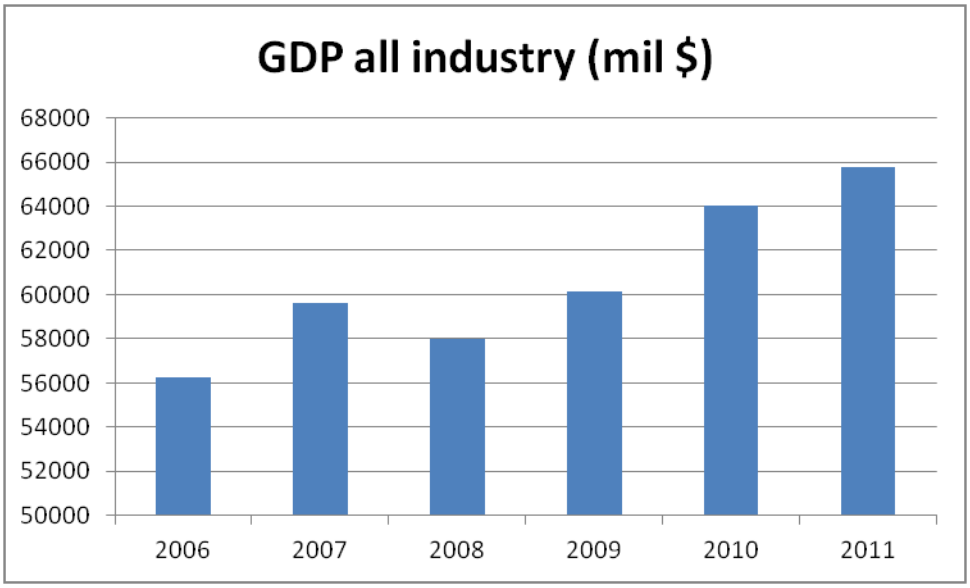


Figure 4-1 shows that except for a decline between 2007 and 2008,[8] all industries increased GDP in every year from 2006 through 2011. Of specific relevance to air quality is the comparison between the time when Delaware's air quality did not meet the $PM_{2.5}$ daily NAAQS (2006-2008 design value) and the time when it did meet the NAAQS (2008-2010 and 2009-2011

[8] According to the Delaware Department of Labor the reason for the decline between 2007 and 2008 was an economic recession that began in Delaware in December 2007.

design values). The GDP in every year between 2008 and 2011 is greater than every year between 2006 and 2008. This analysis of GDP indicates that economic conditions did not contribute to the improvement in air quality.

4.2.2 Meteorology

Delaware evaluated the role meteorology may have played in the improvement in air quality described in 3.2 of this document by evaluating temperature and precipitation data. Temperature and precipitation are the primary meteorological variables that impact the formation of $PM_{2.5}$. Temperature and precipitation impact both the emission from sources (e.g., power plant emissions are highest during very hot and cold weather), and ambient $PM_{2.5}$ concentrations (e.g., precipitation removes $PM_{2.5}$ from the air through deposition).

Delaware analyzed historical meteorological data for Wilmington, Delaware, which is the location where Delaware's highest $PM_{2.5}$ concentrations are recorded (monitor ID = 100032004). Table 4-1 shows 3-year monthly averages for: minimum, maximum and means temperatures (in degrees Fahrenheit), as well as total precipitation by monthly average and for the entire 3-year periods 2006-2008 and 2008-2010.[9]

[9] Recall that 2006-2008 average PM2.5 concentration was used to calculate the final Philadelphia NAA design values causing nonattainment, and the 2008-2010 average PM2.5 concentration was when the Philadelphia NAA initially came into attainment. Therefore, by comparing the meteorology between these two 3-year periods we can evaluate the effect that meteorology had on PM2.5 concentrations during a time when the air quality was nonattainment and a time when it was attainment.

Table 4-1 Min, Max and Mean Temperatures and Total Precipitation (2006-2008 vs. 2008-2010)

	2006-2008	2008-2010	2006-2008	2008-2010	2006-2008	2008-2010	2006-2008	2008-2010
	3-yr AVG Min. Temp (°F)	**3-yr AVG Min. Temp (°F)**	**3-yr AVG Max. Temp (°F)**	**3-yr AVG Max. Temp (°F)**	**3-yr Mean Temp (°F)**	**3-yr Mean Temp (°F)**	**Total Precip (in)**	**Total Precip (in)**
Jan	29.6	24.7	46.2	39.6	37.9	32.2	9.2	7.0
Feb	25.0	26.4	41.6	43.1	33.3	34.8	8.6	10.5
Mar	33.9	35.4	54.2	54.4	44.1	44.9	8.9	11.3
Apr	43.4	44.8	63.8	65.5	53.6	55.2	14.9	8.4
May	51.3	52.9	73.7	73.1	62.5	63.0	8.4	11.3
Jun	63.7	64.4	82.6	83.7	73.2	74.1	14.8	11.2
Jul	67.9	67.0	87.2	87.0	77.6	77.1	13.9	14.8
Aug	65.9	66.4	85.0	84.9	75.4	75.6	7.1	9.2
Sep	58.9	59.6	78.2	78.4	68.5	69.0	11.9	16.1
Oct	47.8	46.1	68.2	65.9	58.0	56.0	13.3	13.2
Nov	38.7	38.9	54.8	55.4	46.8	47.1	9.5	8.1
Dec	31.0	27.5	47.3	42.6	39.1	35.0	11.1	15.4
Annual average 3-Yr Average Temp., and 3-Yr Total Precipitation	**46.4**	**46.2**	**65.2**	**64.5**	**55.8**	**55.3**	**131.7**	**136.5**

From Table 4-1, we see that the annual average 3-year monthly averages for minimum, maximum, and mean temperatures for 2006-2008 are slightly higher than those temperatures during the years 2008-2010 (e.g., the 2006-2008 annual average mean temperature was 55.8 degrees while the 2008-2010 annual average mean temperature was 55.3 degrees). Because temperatures were only slightly lower during the years showing attainment (2008-2010), decreased temperatures did not likely contribute to the improved air quality.

From Table 4-1, we see that 3-year total precipitation was about 3.5% higher in 2008-2010 compared to 2006-2010 (136.5 in. and 131.7 in. respectively). Increased precipitation disfavors $PM_{2.5}$ formation, because it results in deposition of existing ambient $PM_{2.5}$ and precursors. Because total precipitation was only slightly higher during the years showing attainment (2008-2010), increased precipitation did not likely contribute to the improved air quality.

In summary, 1) the annual average 3-year monthly min, max, and mean temperatures are very similar between the nonattainment timeframe (2006-2008) and the attainment timeframe (2008-2010), and 2) the total precipitation is also very similar between those two periods. Therefore, although Meteorology will always play a role in the formation of $PM_{2.5}$, DAQ concludes that meteorology did not play a significant role in air quality improvements for redesignation purposes under the 2006 daily $PM_{2.5}$ NAAQS.

4.2.3 Emission Inventory Improvements from 2007 base year to the 2008 attainment year

It was demonstrated in 4.2.1 and 4.2.2 that neither economic conditions nor meteorology significantly contributed to the improved air quality. Given this, it follows that permanent and enforceable reductions of $PM_{2.5}$, NO_X and SO_2,[10] from a variety of state and federal measures are the primary reason for the improved air quality and attainment of the standard for fine particles.

As discussed previously, in November, 2009 (effective December 14, 2009), EPA published its air quality designations for the 2006 $PM_{2.5}$ NAAQS based upon air quality monitoring data for calendar years 2006–2008 (74 FR 8688). Since 2007, permanent and enforceable reductions of primary $PM_{2.5}$ and secondary $PM_{2.5}$ precursor emissions have contributed to improvements in $PM_{2.5}$ air quality and to the attainment of the daily $PM_{2.5}$ NAAQS. To help demonstrate how emission reductions have improved air quality, we evaluate air quality trends, which can be seen in Table 4-2 and Figures 4-2 and 4-3, and discuss emission reductions due to permanent and enforceable control measures.

The Table values represent the daily average concentrations as calculated from the four calendar quarterly averages at each monitoring site, and the 3-year design values from 2006-2011. As Table 4-2 shows, the highest annual value in the Philadelphia NAA nonattainment area has decreased from 39.0 $\mu g/m^3$ in 2006 (monitor ID 421010047) to 34.0 $\mu g/m^3$ in 2011 (monitor ID 420290100), or 5.0 $\mu g/m^3$, which represents a 12.8% drop. This daily average is the basic statistic used in determining trends and compliance with the daily average NAAQS.

[10] Ammonia and volatile organic compounds (VOC) are contributors to $PM_{2.5}$ formation; however, they are not considered significant overall contributors in the Philadelphia NAA. Therefore, this demonstration of air quality improvements due to permanent and enforceable emission reductions of precursors or direct $PM_{2.5}$ focuses on SO_2, $PM_{2.5}$, and NO_X.

Table 4-2 Philadelphia NAA 2006-2011 daily NAAQS (98th percentiles)

State	County and DE sites	Monitor ID	2006	2007	2008	2009	2010	2011
DE	New Castle (Bellefonte)	100031003	31	32	36	23	24	22
	New Castle (Lums)	100031007	28	30	28	21	28	21
	New Castle (Newark)	100031012	31	31	29	23	25	22
	New Castle (MLK)	100032004	38	34	35	28	28	25
NJ	Camden	340071007	38	35	28	25	23	24
	Gloucester	340150004	-	31	24	22	22	22
PA	Bucks	420170012	34	35	31	26	28	30
	Chester	420290100	38	38	32	31	35	34
	Delaware	420450002	37	34	29	28	33	29
	Montgomery	420910013	36	30	24	27	26	28
	Philadelphia	421010004	38	35	35	26	28	30
	Philadelphia	421010024	35	33	31	26	25	-
	Philadelphia	421010047	39	35	33	27	28	28
	Philadelphia	421010055*	-	-	35	29	29	31
	Philadelphia	421010057	-	-	33	28	28	31
	Philadelphia	421011002	-	-	-	-	-	28
Philadelphia NAA Average µg/m3 (all monitors)			**35**	**33**	**31**	**26**	**27**	**27**

- Camden 340070003 was shutdown in 2008; therefore not included for this 2006-2010 trend analysis
- Gibbstown (Gloucester) monitor: On February 2, 2007, a $PM_{2.5}$ monitor (0004) began sampling at the Gibbstown site which was the replacement for a site discontinued in 2006 (5001) in a different area of Gibbstown.
- Monitor 421010055 in Philadelphia County, Pennsylvania, started operating in 2008.
- Monitor 4210010057 started operating in the 3rd Quarter, 2007.
- Monitor 421011002 started operating in January, 2011.
- ND = monitor did not operate or was not in existence in that year.

As Table 4-2 shows, the daily mean for the Philadelphia NAA decreased from a high of 39 $\mu g/m^3$ in 2006, to 34 $\mu g/m^3$ in 2011, or 5 $\mu g/m^3$, this equates to a 13% drop in the daily mean value. Figure 4-2 illustrates the trends of the yearly 98th percentile $PM_{2.5}$ concentrations of each NAA monitor since 2006, which are generally decreasing. Figure 4-3 also shows 2006-2011 yearly 98th percentiles, but instead of showing a trend for each monitor, all the monitors in the Philadelphia NAA were averaged. This helped eliminate some variability between monitors in order to get a NAA-wide overall trend. Figure 4-4 shows the downward trends since 2006 using 3-year rolling-averages, which smoothes out inter-monitor variability yet uses actual design values for each monitor. Figure 4-5 is a variation on Figure 4-4 by plotting the average design values per year, calculated from all monitors in the Philadelphia NAA.

Figure 4-2 Philadelphia NAA – 2006 to 2011 daily $PM_{2.5}$ trends

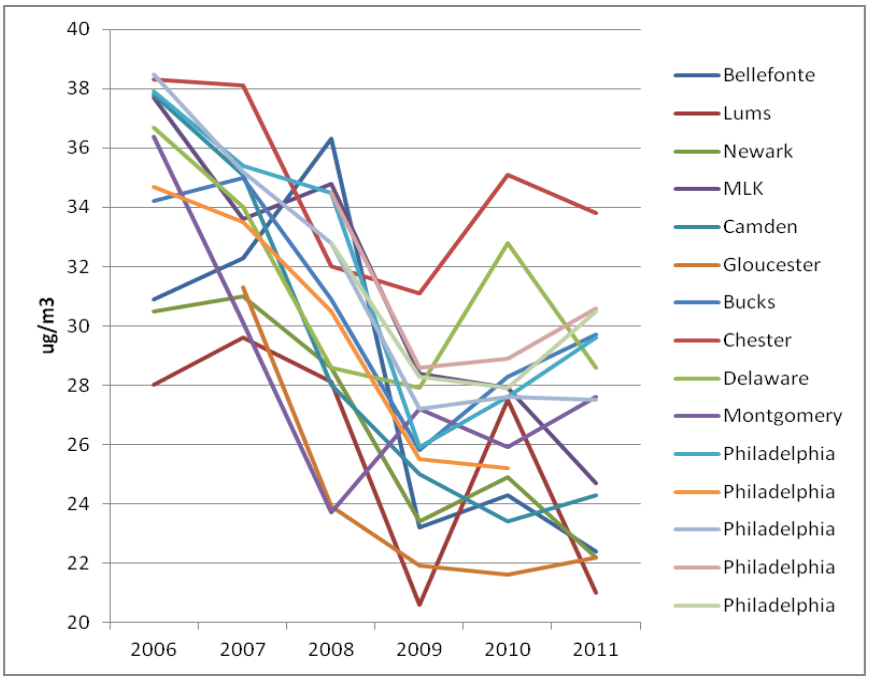


Figure 4-3 Philadelphia NAA – daily $PM_{2.5}$ trends (avg. all monitors)

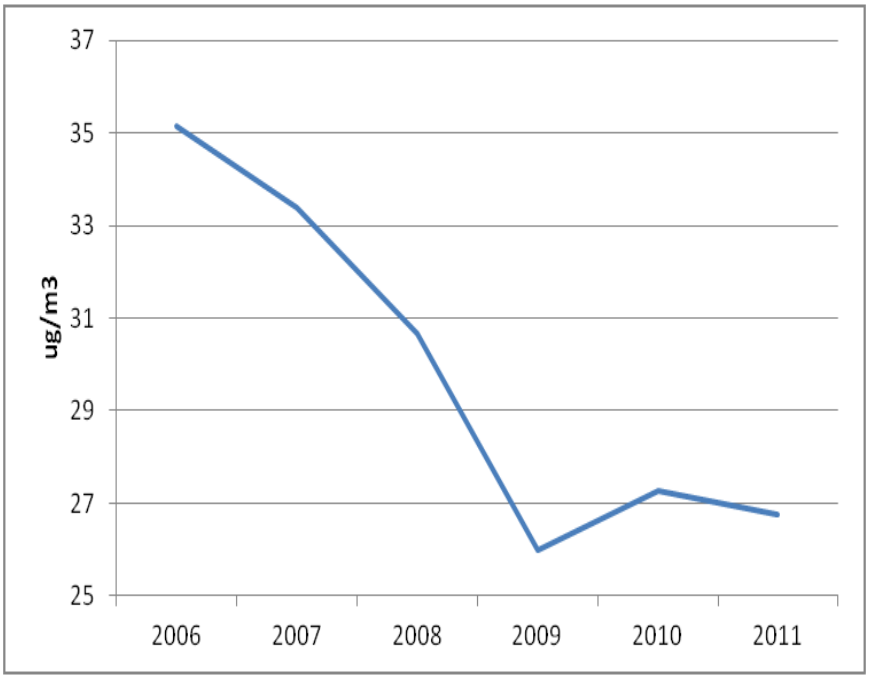


Figure 4 Philadelphia NAA – 2006 to 2011 $PM_{2.5}$ 3-Year Rolling Averages

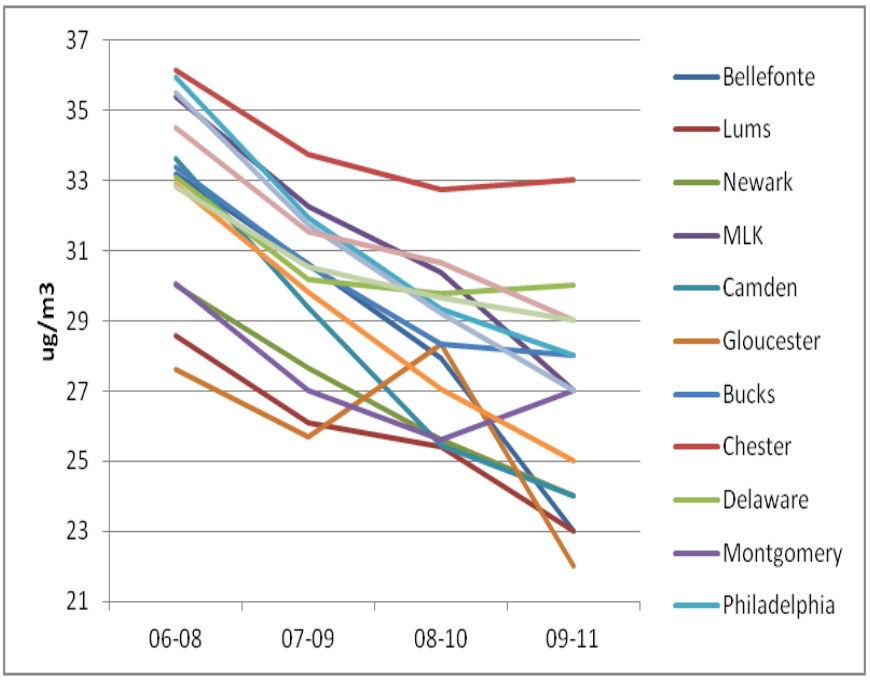
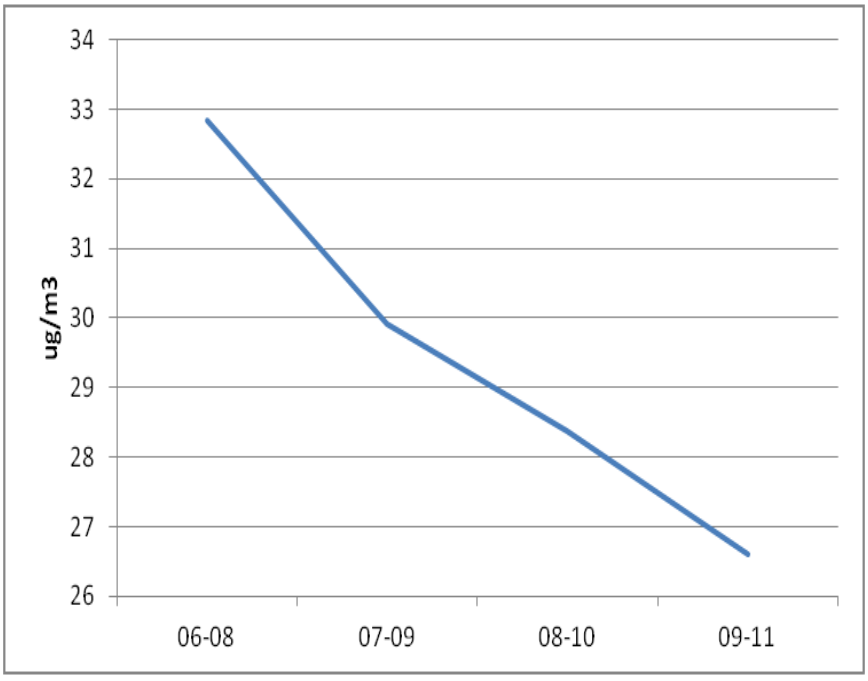


Figure 4.5 Philadelphia NAA – daily $PM_{2.5}$ trends (avg. all monitors)



Some of these air quality improvements were a result of emissions reductions which were due to the application of tighter federal emission standards on motor vehicles and fuels, and some due to the requirements of the federal NOx SIP Call. Others were due to Delaware-

specific control measures. Section 4 of this plan describes these reductions in more detail, along with an explanation of their regulatory status.

One of the ways states have demonstrated how controls have contributed to reductions is by comparing a base year emission inventory to the attainment year emission inventory. The EPA's $PM_{2.5}$ Emissions Inventory Guidance required that states with $PM_{2.5}$ NAAQS nonattainment areas prepare and submit a base year inventory of anthropogenic sources of direct $PM_{2.5}$ and precursors of secondary $PM_{2.5}$ emissions, namely NOx and SO_2. The 2007 base year inventory included emissions from point, non-point, on-road mobile and non-road mobile emissions. It was picked as the base year for the daily redesignation request and maintenance plan because it reflects one of the years in which Delaware was designated nonattainment (e.g., 2006-2008).

The 2007 inventory was developed through the MARAMA regional planning process. Documentation of how the 2007 attainment year was developed can be found in *Technical Support Document for the Development of the 2007 Emission Inventory for Regional Air Quality Modeling in the Northeast / Mid-Atlantic Region Version 3.3 January 23, 2012*. The MARAMA 2007 TSD includes annual emissions for carbon monoxide (CO), ammonia (NH3), oxides of nitrogen (NOx), particulate matter (PM), sulfur dioxide (SO_2), and volatile organic compounds (VOC). The PM species in the inventory are categorized as: filterable and condensable particles with an aerodynamic diameter less than or equal to a nominal 10 and 2.5 micrometers (i.e., PM10-PRI and PM25-PRI); filterable particles with an aerodynamic diameter less than or equal to a nominal 10 and 2.5 micrometers (i.e., PM10-FIL and PM25-FIL); and condensable particles (PM-CON). Note that PM10-PRI equals the sum of PM10-FIL and PM-CON, and PM25-PRI equals the sum of PM25-FIL and PM-CON.

The Philadelphia NAA first came into attainment for the 2006 daily $PM_{2.5}$ NAAQS based on 2008-2010 data. Delaware is using 2008 as the attainment year (e.g., one of the three years during which the area attained the standard as the attainment year inventory), from which future inventories are projected in the maintenance plan. Documentation of how the 2008 attainment year was developed can be found in the *2008 Attainment Year State Implementation Plan Emissions Inventory for $PM_{2.5}$, SO_2, and NO_x.*

Table 4-3 summarizes 2007 and 2008 emissions by major source category and by pollutant for New Castle County, as well as the change in terms of tons per year (tpy) and percent decrease/increase.

Table 4-3 New Castle County 2007-2008 Emission Changes

Source Sector	NOx				$PM_{2.5}$				SO_2			
	2007	2008	Δ (tpy)	Δ (%)	2007	2008	Δ (tpy)	Δ (%)	2007	2008	Δ (tpy)	Δ (%)
Point	6,635	5,589	1,046	16%	1,335	1,109	226	17%	13,380	10,576	2,805	21%
Non-point	1,293	1,287	6	0%	1,207	1,191	16	1%	630	402	228	36%
On-road	10,577	9,311	1,266	12%	324	283	42	13%	100	94	6	6%
Non-road	4,580	4,317	263	6%	327	312	15	5%	1,118	1,067	51	5%
All Sectors	**23,084**	**20,504**	**2,580**	**11%**	**3,193**	**2,894**	**300**	**9%**	**15,228**	**12,139**	**3,089**	**20%**

By comparing the 2007 and 2008 inventories, we see that total direct $PM_{2.5}$ emissions were reduced by 300 tons per year, and that NOx emissions decreased by 2,580 tons per year. These reductions were primarily from on-road and non-road mobile sources.

4.3 Enforceable and Permanent $PM_{2.5}$, NOx and SO_2 Measures that Contributed to Improved Air Quality between 2007 and 2008

4.3.1 Delaware-specific Control Measures

- 7 DE Admin. Code 1144, Control of Stationary Generator Emissions, SO_2, PM, VOC and NO_X emission control, State-wide, Effective January 2006; EPA SIP approval date 08/11/2010 (75 FR 48566).

- 7 DE Admin. Code 1148, Control of Stationary Combustion Turbine Electric Generating Unit Emissions, NO_X emission control, State-wide, Effective July, 2007. This regulation was approved into the Delaware SIP by EPA on 08/11/2010. (75 FR 48566).

- 7 DE Admin. Code 1142, Section 1, Control of NO_X Emissions from Industrial Boilers, NO_X emission control, Effective December 2001. This regulation was approved into the Delaware SIP by EPA on 11/22/01 (67 FR 70315) Section 2, Control of NO_X Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries, NO_X emission control, New Castle County, Effective July 2007. This regulation was revised and approved into the Delaware SIP by EPA on 5/15/12 (77 FR 28489).

- 7 DE Admin. Code 1131- Low Enhanced Inspection and Maintenance. Delaware's enhanced I/M program was approved into the Delaware SIP by EPA on September 30, 1999 (64 FR 52657). Revisions to the enhanced I/M program were approved by EPA on 11/26/2003 (68 FR 228).

4.3.2 Federal Control Measures

Area Sources

EPA's New Source Performance Standards for Woodstoves (NSPS). These standards are codified at 40 CFR Part 60, subpart AAA. The final standards were promulgated in 1988 (53 FR 5860). The rule requires manufacturers of new residential wood heaters (e.g., wood stoves) to design heaters to meet particulate emission (PM) limits, have representative model lines tested by EPA-accredited labs, and attach EPA labels and hangtags after EPA approval.

Control Programs Included in the NMIM/NONROAD Model

Under 40 CFR Part 89, EPA adopted standards for emissions of NO_X, hydrocarbons (HC), and carbon monoxide (CO) from several groups of nonroad engines, including industrial spark-ignition engines and recreational nonroad vehicles. Industrial spark-ignition engines power commercial and industrial applications and include forklifts, electric generators, airport baggage transport vehicles, and a variety of farm and construction applications. Nonroad recreational vehicles include snowmobiles, off-highway motorcycles, and all-terrain vehicles. These rules were initially effective in 2004 and will be fully phased in by 2012.

Control of Air Pollution; Determination of Significance for Nonroad Sources and Emission Standards for New Nonroad Compression Ignition Engines at or Above 37 Kilowatts 59 FR 31036, June 17, 1994. This rule establishes Tier 1 exhaust emission standards for HC, NOx, CO, and PM for nonroad compression-ignition (CI) engines ≥37kW (≥50hp). Marine engines are not included in this rule. The start dates and pollutants affected vary by hp category as follows:

- 50-100 hp: Tier 1,1998; NOx only
- 100-175 hp: Tier 1, 1997; NOx only
- 175-750 hp: Tier 1, 1996; HC, CO, NOx, PM
- >750 hp: Tier 1, 2000; HC, CO, NOx, PM

Emissions for New Non-road Spark-Ignition Engines At or Below 19 Kilowatts; Final Rule 60 FR 34581. July 3, 1995. This rule establishes Phase 1 exhaust emission standards for HC, NOx, and CO for nonroad spark-ignition engines ≤19kW (≤25hp). This rule includes both handheld (HH) and non-handheld (NHH) engines. The Phase 1 standards became effective in 1997 for:

- Class I NHH engines (<225cc),
- Class II NHH engines (≥225cc),
- Class III HH engines (<20cc), and
- Class IV HH engines (≥20cc and <50cc).

The Phase 1 standards become effective in 1998 for: Class V HH engines (≥50cc).

Final Rule for New Gasoline Spark-Ignition Marine Engines; Exemptions for New Nonroad Compression-Ignition Engines at or Above 37 Kilowatts and New Nonroad Spark-Ignition Engines at or Below 19 Kilowatts 61 FR 52088. October 4, 1996. This rule establishes exhaust emission standards for HC+NOx for personal watercraft and outboard (PWC/OB) marine spark-ignited (SI) engines. The standards are phased in from 1998-2006.

Control of Emissions of Air Pollution from Nonroad Diesel Engines 63 FR 56967 October 23, 1998. This final rule sets Tier 1 standards for engines under 50 hp, phasing in from 1999 to 2000. The rule also phases in more stringent Tier 2 standards for all engine sizes from 2001 to 2006, and yet more stringent Tier 3 standards for engines rated over 50 hp from 2006 to 2008. The Tier 2 and Tier 3 standards apply to NMHC+NOx, CO, and PM. The start dates by hp category and tier are as follows:

- hp: < 8kW and 8-19kW: Tier 1, 2000; Tier 2, 2005; no Tier 3
- 19-37kW: Tier 1, 1999; Tier 2, 2004; no Tier 3
- 37-75kW: Tier 2, 2004; Tier 3, 2008
- 75-130kW: Tier 2, 2003; Tier 3, 2007
- 130-225kW: Tier 2, 2003; Tier 3, 2006
- 225-450kW: Tier 2, 2001, Tier 3, 2006
- 450-560kW: Tier 2, 2002; Tier 3, 2006
- >560kW: Tier 2, 2006, no Tier 3

This rule does not apply to marine diesel engines above 50 hp.

Phase 2: Emission Standards for New Nonroad Non-handheld Spark Ignition Engines At or Below 19 Kilowatts 64 FR 15207. March 30, 1999. This rule establishes Phase 2 exhaust emission standards for HC+NOx for nonroad non-handheld (NHH) spark-ignition engines ≤19kW (≤25hp). The Phase 2 standards for Class I NHH engines (<225cc) become effective on August 1, 2007 (or August 1, 2003 for any engine initially produced on or after that date). The Phase 2 standards for Class II NHH engines (≥225cc) were phased in from 2001-2005.

Phase 2: Emission Standards for New Nonroad Spark-Ignition Handheld Engines At or Below 19 Kilowatts and Minor Amendments to Emission Requirements Applicable to Small Spark-Ignition Engines and Marine Spark-Ignition Engines; Final Rule 65 FR 24268 April 25, 2000. This rule establishes Phase 2 exhaust emission standards for HC+NOx for nonroad handheld (HH) spark-ignition engines ≤19kW (≤25hp). The Phase 2 standards were phased in from 2002-2005 for Class III and Class IV engines and were phased in from 2004-2007 for Class V engines.

Control of Emissions From Nonroad Large Spark-Ignition Engines and Recreational Engines (Marine and Land-Based); Final Rule 67 FR 68241. November 8, 2002. This rule establishes exhaust and evaporative standards for several nonroad categories:

1) Two tiers of emission standards are established for large spark-ignition engines over 19 kW. Tier 1 includes exhaust standards for HC+NOx and CO and was phased in from 2004-2006. Tier 2 became effective in 2007 and includes exhaust standards for HC+NOx and CO as well as evaporative controls affecting fuel line permeation, diurnal emissions and running loss emissions.

2) Exhaust and evaporative emission standards are established for recreational vehicles, which include snowmobiles, off-highway motorcycles, and all-terrain vehicles (ATVs). For snowmobiles, HC and CO exhaust standards are phased-in from 2006-2012. For off-highway motorcycles, HC+NOx and CO exhaust emission standards are phased in from 2006-2007. For ATVs, HC+NOx and CO exhaust emission standards are phased in from 2006-2007. Evaporative emission standards for fuel tank and hose permeation apply to all recreational vehicles beginning in 2008.

3) Exhaust emission standards for HC+NOx, CO, and PM for recreational marine diesel engines over 50 hp begin in 2006-2009, depending on the engine displacement. These are "Tier 2" equivalent standards.

*Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule (Clean Air Nonroad Diesel Rule – Tier 4)*69 FR 38958, June 29, 2004. This final rule sets Tier 4 exhaust standards for CI engines covering all hp categories (except marine and locomotives), and also regulates nonroad diesel fuel sulfur content.

1) The Tier 4 start dates and pollutants affected vary by hp and tier as follows:

Rated Power	**First Year that Standards Apply**	**PM (g/hp-hr)**	**NOx (g/hp-hr)**
hp < 25	2008	0.30	-
25 ≤ hp < 75	2013	0.02	3.5*
75 ≤ hp < 175	2012-2013	0.01	0.30
175 ≤ hp < 750	2011-2013	0.01	0.30
hp ≥ 750	2011-2014 2015	0.075 0.02/0.03**	2.6/0.50† 0.50††

* The 3.5 g/hp-hr standard includes both NOx and nonmethane hydrocarbons.
† The 0.50 g/hp-hr standard applies to gensets over 1200 hp.

** The 0.02 g/hp-hr standard applies to gensets; the 0.03 g/hp-hr standard applies to other engines.
†† Applies to all gensets only.

2) This rule will reduce nonroad diesel fuel sulfur levels in two steps. First, starting in 2007, fuel sulfur levels in nonroad diesel fuel will be limited to a maximum of 500 ppm, the same as for current highway diesel fuel. Second, starting in 2010, fuel sulfur levels in most nonroad diesel fuel will be reduced to 15 ppm.

Control of Emissions from Nonroad Spark-Ignition Engines and Equipment; Final Rule (Bond Rule), 73 FR 59034 October 8, 2008. This rule establishes exhaust and evaporative standards for small SI engines and marine SI engines:

1) Phase 3 HC+NOx exhaust emission standards are established for Class I NHH engines starting in 2012 and for Class II NHH engines starting in 2011. There are no new exhaust emission standards for handheld engines. New evaporative standards are adopted for both handheld and non-handheld equipment. The new evaporative standards control fuel tank permeation, fuel hose permeation, and diffusion losses. The evaporative standards begin in 2012 for Class I NHH engines and 2011 for Class II NHH engines. For handheld engines, the evaporative standards are phased-in from 2012-2016.

2) More stringent HC+NOx and CO standards are established for marine SI PWC/OB engines beginning in 2010. In addition, new exhaust HC+NOx and CO standards are established for stern-drive and inboard (SD/I) marine SI engines also beginning in 2010. High performance SD/I engines are subject to separate HC+NOx and CO exhaust standards that are phased-in from 2010-2011.

On-Road Emissions Programs

In the 2007 heavy-duty highway rule, which is codified in 40 CFR Part 86, Subpart P, EPA set a PM emission standard for new heavy-duty engines of 0.01 grams per brake horsepower-hour (g/bhp-hr). This standard took full effect for diesel engines in the 2007 model year. This rule included standards for NO_X and non-methane hydrocarbons (NMHC) of 0.20 g/bhp-hr and 0.14 g/bhp-hr, respectively. These diesel engine NO_X and NMHC standards were successfully phased in together between 2007 and 2010. The rule also required that sulfur in diesel fuel be reduced to facilitate the use of modern pollution control technology on these trucks and buses. EPA required a 97% reduction in the sulfur content of highway diesel fuel -- from levels of 500 parts per million (ppm) for low sulfur diesel to 15 ppm for ultra-low sulfur diesel. The reductions in sulfur content engendered similar reductions in SO_2 emissions. These requirements were successfully implemented on the timeline in the regulation.

Federal Tier 1 New Vehicle Emission and New Federal Evaporative Emission Standards: Under CAA Section 202, EPA established federal motor vehicle emission standards (Tier I standards), which were phased in beginning with model year 1994. The benefits of this program are reflected in the 2007 base year inventory and the 2008 attainment year inventory. This federally implemented program affects light duty vehicles and light duty trucks. The regulations

require more stringent exhaust emission standards as well as a uniform level of evaporative emission controls.

The Tier 2 vehicle and gasoline sulfur program, as codified in Subpart H of 40 CFR Part 80, 40 CFR Part 85, and 40 CFR Part 86, became effective in the 2005 model year. This program for fleet averaging of on-road vehicles is modeled after the California LEV II standards. The Tier 2 program allows manufacturers to produce vehicles with emissions ranging from relatively dirty to very clean, but the mix of vehicles a manufacturer sells each year must have average NO_X emissions below a specified value. Mobile emissions continue to benefit from this program as motorists replace older, more polluting vehicles, with cleaner vehicles.

Delaware participated in the Ozone Transport Commission (OTC) National Low Emission Vehicle Program: Under the OTC National Low Emission Vehicle (NLEV) program, automobile manufacturers agreed to comply with tailpipe standards that were more stringent than EPA could mandate prior to model year 2004. For the OTC states, starting with the model year 1999 all new vehicles sold in the region must comply with the more stringent LEV standards. Once manufacturers committed to the program, the standards became enforceable in the same manner in which other federal motor vehicle emission control requirements were enforceable. The program was in place nationwide for model year 2001, and the benefits of this program are reflected in the 2007 base year inventory and the 2008 attainment year inventory.

In addition to the federal Tier 1 and 2 programs, NLEV, and the federal 2007 heavy duty highway rule, Delaware has instituted enhanced vehicle emissions inspection and maintenance (DE Admin Code 1131-Low Enhanced Inspection and Maintenance) requirements in New Castle County and Kent County. The requirements involve mandating regional vehicle emission I/M programs that are stricter than basic programs, as required under Section182 and 202 of the CAA. Before 1994, basic automobile emissions testing checked only tailpipe emissions while idling and sometimes at 2,500 rpm. For Delaware, the Low Enhanced I/M procedures include the use of On Board Diagnostic (OBD) system evaluations, fuel system pressure test and a gas cap test. The procedures also include anti-tampering inspections of the catalytic converter, gas cap and fuel inlet restrictor. The OBD evaluations provide a more complete inspection, checking for excess evaporative emissions and other issues that might affect emissions from the vehicle.

5 SIP Completeness - Fully Approved SIP, Section 110 and Part D Requirements

5.1 EPA Requirements

States must provide assurances that the applicable implementation plan has been fully approved by EPA under Section 110(k) and must satisfy all requirements that apply to the area. An area cannot be redesignated if a required element of its plan is the subject of disapproval; a finding of failure to submit or to implement the SIP; or partial, conditional, or limited approval.

For purposes of redesignation, states must also meet all requirements of Section 110 and Part D of the CAA that were applicable prior to submittal of the complete redesignation request. The general elements required in a SIP are listed in Section 110(a). These elements include procedures for air quality monitoring and modeling; criteria for establishing stationary source

controls, monitoring and reporting; implementation of permitting programs under Part C (Prevention of Significant Deterioration or PSD) and Part D (New Source Review or NSR); and provisions for public involvement. Subpart 1 of Part D consists of general requirements applicable to all areas which are designated nonattainment based on a violation of the NAAQS. Subpart 4 of Part D consists of more specific requirements applicable to particulate matter (specifically to address PM_{10}).

5.2 Delaware Approach

Section 110(a) of the CAA contains the general requirements for a SIP. Delaware concludes that, as EPA has stated in previous rulemaking,[11] only the section 110 and part D requirements that are linked with a particular area's designation are the relevant measures which DAQ may consider in evaluating a redesignation request. Further, DAQ believes that the other section 110 elements that are not connected with nonattainment plan submissions and not linked with an area's attainment status are also not applicable requirements for purposes of redesignation. DAQ understands that a state remains subject to these requirements after an area is redesignated to attainment.

The requirements of section 110(a)(2) are statewide requirements that are not linked to the $PM_{2.5}$ nonattainment status of the Philadelphia NAA. Therefore, DAQ believes that these SIP elements are not applicable requirements for purposes of review of the state's $PM_{2.5}$ redesignation request.

5.3 Part D Plan Requirements for Nonattainment Areas

Nonattainment Areas in General

CAA Section 172(c) – In accordance with EPA's applicable $PM_{2.5}$ implementation rule, EPA's planned Rulemaking by December, 2012 on Philadelphia's Clean Data Determination will suspend the attainment demonstration, reasonably available control measures/reasonably available control technology (RACM/RACT), reasonable further progress (RFP), and contingency measure requirements under 172(c) related to attainment of the 2006 daily $PM_{2.5}$ NAAQS, for so long as the area continues to attain the 2006 daily $PM_{2.5}$ NAAQS. Therefore, EPA will not consider those SIP requirements for the purposes of redesignation. However, the base year inventory requirement under 172(c)(3) is not suspended. Delaware will meet this requirement when EPA fully approves the 2007 base year inventory submitted with this daily $PM_{2.5}$ NAAQS redesignation and maintenance SIP.

CAA Section 176(c) was established under the CAA to address conformity. Conformity plays an important role in helping states and tribal regions improve air quality in those areas that do not meet the NAAQS. Under the separate general and transportation conformity rules, federal agencies must work with state, tribal, and local governments in nonattainment and maintenance

[11] See EPA's proposed approval of Ohio's redesignation request for the Ohio portion of the Huntington-Ashland nonattainment area for the 1997 $PM_{2.5}$ NAAQS, (76 FR 79593).

areas to ensure that federal actions, including highway and transit projects, conform to the initiatives established in the applicable state or tribal implementation plan.

General Conformity

On November 30, 1993, EPA promulgated a set of regulations, known as the General Conformity Regulations, which apply to non-transportation projects (i.e., projects not adding or expanding highways and transit). These regulations ensured that these types of federal actions also conformed to the SIPs (58 FR 63214). The purpose of the General Conformity Rule is to:

- Ensure that federal activities do not interfere with the budgets in the state implementation plans (SIPs);
- Ensure the attainment and maintenance of the national ambient air quality standards (NAAQS); and
- Ensure that actions do not cause or contribute to new violations of a NAAQS.

General conformity must be met for any federal action, defined as an activity engaged in by a department or agency of the federal government, or supported in any way by the federal government (including via financial assistance, licenses, permits, or approvals). The Federal Agency must make a determination that the activity conforms to the applicable State Implementation Plan before commencing the activity.

A conformity analysis must be conducted by the lead Federal Agency if a federal action would result in the generation of air emissions that would exceed conformity threshold levels of pollutants for which an air basin that is designated as a nonattainment or maintenance area under the NAAQS, or if emissions from the action are deemed regionally significant. A conformity analysis must demonstrate that the project emissions would conform, and thus would not degrade air quality in the impacted air basin. Conformity can be demonstrated via emission offsets, SIP provisions, or air quality modeling. The EPA is responsible for reviewing and approving SIPs, which are prepared and submitted to EPA by state environmental agencies.

Transportation Conformity

Transportation conformity is a provision in the CAA, which requires that a conformity demonstration be performed by either Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) demonstrating that transportation-related highway construction will not interfere with achieving NAAQS. The concept of transportation conformity was introduced in the Clean Air Act of 1977, but the requirements became substantially more rigorous in the Amendments of 1990. The CAA and the Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) define the framework for effective integration of transportation and air quality planning.

Transportation conformity is a process by which it is determined that on-road mobile (highway) source emissions evaluated from the Transportation Improvement Program (TIP) and/or Long Range Transportation Plan (LRTP) will not adversely impact air quality in a

determined area of nonattainment. Federal funding and approval are given to transportation activities that are consistent with air quality goals.

As discussed in more detail in Section 8 of this plan, Delaware revised its 2008 Annual $PM_{2.5}$ Attainment Demonstration SIP in 2012, to address the emission factor changes in the new EPA MOVES model, and to establish new budgets for the purposes of addressing transportation conformity. Development of the 2008 Annual $PM_{2.5}$ SIP involved the interagency consultative process between EPA, DNREC, Delaware Department of Transportation and local transportation agencies such as the Wilmington Area Planning Council (WILMAPCO). WILMAPCO is the metropolitan planning organization for New Castle County, Delaware and Cecil County, Maryland, and also facilitates the public participation process for stakeholders and citizens in the State of Delaware. The 2012 SIP revision to the April 2008 $PM_{2.5}$ Attainment Demonstration SIP was a change to Delaware's motor vehicle emissions budgets under the $PM_{2.5}$ annual NAAQS, and was submitted to EPA on May 3, 2012.[12] However, EPA has not completed rulemaking on the 2008 SIP and the May 3, 2012 Revision.

Delaware's SIP contains provisions that are consistent with the Section176(c) conformity requirements. In Delaware's SIP, general conformity requirements are contained in 7 DE Admin. Code 1135, Conformity of General Federal Actions to the State Implementation Plans (Regulation for General Conformity) which was approved into the Delaware SIP by EPA on 08/11/2010 (75 FR 48566). Transportation conformity requirements are contained in 7 DE Admin. Code 1132, Transportation Conformity which was approved into the Delaware SIP by EPA on 08/11/2010, (75 FR 48566).

6 Maintenance Plan

6.1 EPA Requirements

Section 107(d)(3)(E) of the CAA requires a maintenance plan to meet the requirements of Section 175(A). The maintenance plan constitutes a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least 10 years after redesignation, including contingency measures to ensure prompt correction of any violation of the NAAQS. Section 175(A) further states that the plan shall contain such additional measures, if any, as may be necessary to ensure such maintenance. Mobile vehicle emission budgets for transportation conformity purposes are also established within the maintenance plans. States must submit a SIP revision eight years after the original redesignation request is approved to provide for maintenance of the NAAQS for an additional 10 years following the first 10-year period.

EPA provided guidance dated September 4, 1992 on the redesignation request and maintenance plan process in the memorandum from John Calcagni, Director, Air Quality Management Division to Regional Air Directions entitled *Procedures for Processing Requests to Redesignate Areas to Attainment* (redesignation and maintenance plan guidance). Other

12 This daily maintenance plan SIP revision will establish motor vehicle emission budgets for NOx and primary $PM_{2.5}$ for the interim year 2017, and the final year of the maintenance plan, which is 2025. These budgets are adopted from the 2008 $PM_{2.5}$ SIP revision, submitted to EPA in May, 2012.

requirements are provided in 40 CFR 51 Subpart Z, entitled *Provisions for Implementation of $PM_{2.5}$ National Ambient Air Quality Standards* ($PM_{2.5}$ implementation rule). Additional guidance was received from EPA regional staff in the development of this maintenance plan through participation in the Mid-Atlantic Regional Air Management Association (MARAMA) $PM_{2.5}$ workgroup, emails and conference calls, as well as reviewing and providing comments on several technical support documents developed through the regional modeling efforts.

EPA requires the following provisions to ensure maintenance of the NAAQS:

- The state must develop an attainment emissions inventory to identify the level of emissions in the area which is sufficient to attain the NAAQS.

- A state may generally demonstrate maintenance by showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory over the 10-year period following redesignation.

- Once an area has been redesignated, the state must continue to operate an appropriate air quality monitoring network in order to verify the area's attainment status.

- The state must ensure that it has the legal authority to implement and enforce all measures necessary to attain and maintain the NAAQS. Continued attainment must be verified by the state by indicating how maintenance plan progress will be tracked.

- Contingency measures must be available to promptly correct any NAAQS violation. At a minimum, the contingency measures must include a requirement that the state will implement all measures contained in the nonattainment SIP prior to redesignation.

6.2 Delaware Approach

The State of Delaware has developed this maintenance plan which meets all of EPA requirements and demonstrates that because of permanent and enforceable measures, emissions will remain below the 2008 attainment year levels over the 10 years following redesignation approval will while allowing for growth in population and vehicle miles traveled. The period covered by this maintenance plan is 2008 through 2025, with an interim year of 2017.

Delaware has developed an emissions inventory in accordance with EPA guidance that identifies the level of emissions sufficient to achieve the 2006 $PM_{2.5}$ NAAQS. This attainment inventory consists of the actual 2008 emissions (i.e., a year during the three-year period associated with the 2008-2010 monitoring data showing attainment of the 2006 $PM_{2.5}$ NAAQS). The plan includes a demonstration that emissions will remain beneath the 2008 levels for a 10-year period following redesignation, by keeping in place all elements of the current federal and state regulatory programs and putting in place additional controls.

As discussed in Section 3.5.1, the State of Delaware will continue to operate and maintain its air quality monitoring network. Delaware has the legal authority to implement and enforce specified measures necessary to attain and maintain the NAAQS.

In addition to maintaining key elements of its regulatory program, the State of Delaware will acquire air quality monitoring and source emissions data to track attainment and maintenance. The maintenance plan includes contingency measures, as necessary, to promptly correct any NAAQS violation that occurs after redesignation of the area.

The following sections provide detail on each of the above requirements, and the State of Delaware approach to meeting each requirement.

7 Attainment Inventory

7.1 EPA Requirements

The State of Delaware must develop an attainment year emissions inventory to identify the level of emissions sufficient to achieve the NAAQS. This inventory should be consistent with EPA's most recent guidance on emission inventories for nonattainment areas available at the time, and should include emissions during the time period associated with the monitoring data showing attainment of the 2006 $PM_{2.5}$ NAAQS. Where a state has made an adequate demonstration that air quality has improved as a result of their State Implementation Plan (SIP), the attainment inventory will generally be the actual inventory during the time period the area attained the standard. The inventory should be based on emissions of SO_2, NO_X, and primary $PM_{2.5}$ in units of tons per year (tpy) during the attainment year.

In March, 2012 EPA released guidance addressing Implementation of the 2006 24-hr PM2.5 NAAQS.[13] The guidance states:

> *"Statewide annual emission inventories are required under 40 CFR Part 51, Subpart A. [EPA] expect that for many nonattainment areas, these annual inventories will serve as an appropriate starting point for the emissions inventories used for SIP development. In contrast with the 1997 annual $PM_{2.5}$ NAAQS, where states rely only on annual inventories in the implementation process, the 2006 24-hour $PM_{2.5}$ NAAQS is designed to protect against peak exposures. Thus, for the 2006 24-hour $PM_{2.5}$ NAAQS, there are some circumstances in which the EPA believes that seasonal inventories may be useful for SIP planning purposes. For example, we have observed that in some nonattainment areas, all of the highest fine particle concentrations over the course of a year occur in one season. If exceedances occur during only one season for each of the years on which the nonattainment designation is based, and this is the case for all subsequent years, [EPA] recommends that states develop a seasonal inventory and that they use this inventory for SIP planning purposes…. [EPA] also observed that some areas in the northern states have elevated ammonium nitrate levels in the winter, as nitrate remains in particle form and does not volatilize at lower temperatures.*

[13] Memorandum from Stephen Page, OAQPS to Regional Air Directors entitled, *Implementation Guidance for the 2006 24-Hour Fine Particulate National Ambient Air Quality Standard (NAAQS)*.

7.2 Delaware Approach

Seasonal Versus Annual Inventories

The State of Delaware developed an attainment year emissions inventory that identifies the level of emissions sufficient to achieve the 2006 daily $PM_{2.5}$ NAAQS. The attainment inventory consists of actual emissions for a year during the three-year period associated with the monitoring data showing attainment of the $PM_{2.5}$ standard, that is, 2008 for the daily NAAQS maintenance plan. The 2008 inventory is appropriate to use because it represents the typical inventory for the first three-year period demonstrating attainment of the standard (2008-2010). The 2008 inventory is consistent with EPA inventory guidance; is based on annual emissions of SO_2, NO_X, and primary $PM_{2.5}$ during 2008; and contains a list of sources and emissions in tpy.

The following analysis describes Delaware's rationale for using annual emissions instead of daily emissions.

Analysis of Top 10 Days per Year - Seasonal Percentages

States and the City of Philadelphia in the Philadelphia NAA were asked by the MARAMA $PM_{2.5}$ redesignations workgroup to provide the top 10 percent of values for each monitor. Specifically, the following monitor attributes were requested of each State/City (via spreadsheet template): Year, Season, Month, Date, Rank and Sample Value.

Data Completeness & Consistency

For the Gibbstown, NJ monitor, 2006 data was not included in the analysis since only January through March readings were recorded for that year. The Camden, NJ monitor for 2008 has no readings after 9/19/2008. In reviewing the data from the other monitors in the NAA area for the time period in 2008 that Camden had no readings, there is only one reading (24.4 $\mu g/m^3$ at Bristol, PA) that makes the top 10. Based on data from the other monitors, we did not see a loss of data that would affect the seasonality analysis, so we included Camden's 2008 data. The Camden monitor did not operate in 2009 or 2010, so data from Camden biases the earlier evaluation years.

The City of Philadelphia has several monitors that did not operate throughout the 2006-2010 timeframe. Elmwood Avenue (ELM-FD) did not operate in 2008, 2009 and 2010. FAB-F did not operate during 2006 and 2007. Normalizing the dataset due to lack of data for those years was not taken into account for this analysis due to time constraints. Furthermore, for purposes of this assessment on whether to use summer or winter, or neither; it was decided that because fourteen of the seventeen monitors operated continuously, their large dataset provides enough information to make a good decision.

Regional Consistency

Table 7-1 shows the total number of exceedances between 2006 and 2010, and the number of times four or more monitors in the Philadelphia NAA exceeded the standard on the

same day (if we looked at two or more monitors, the percent of dates would rise to 82%). There is good consistency between monitors, including across states, for many of the high reading episodes, in the summer and the other seasons because in 73% of the exceedances, four or more monitors exceeded the same day.

Table 7-1 Summer vs. Winter – Regional Consistency

Date	# of Monitors Exceeding NAAQS
8/7/2007	14
7/29/2008	11
6/19/2006	10
12/30/2010	9
11/28/2006	8
8/3/2006	8
1/19/2009	8
6/7/2008	7
1/29/2008	6
3/15/2009	6
7/12/2006	5
6/26/2007	5
8/8/2007	5
7/18/2008	5
7/11/2006	4
8/6/2007	4
11/9/2009	4
7/10/2007	4
7/9/2007	4
Sum	127
Total Exceed	173
% of dates more than 4 monitors exceeded NAAQS	73%

The next step was to tabulate a summary table of all monitors in the NAA for a given time period (ex. 2006-2010), and average the percentage per season of the top 10 values. Table 7-2 provides percentages by season. It is evident from looking at Table 7-2 both summer and winter are dominant seasons for $PM_{2.5}$.

Table 7-2 2006-2010 Seasonal $PM_{2.5}$ Average Percentages

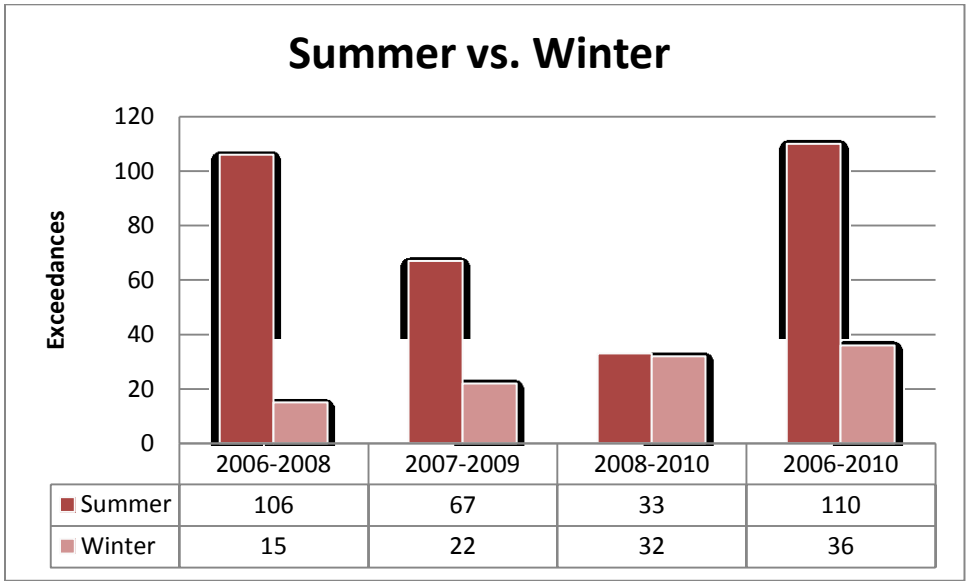
Season	Philadelphia NAA Average 2006-2010
Summer	43%
Fall	9%
Winter	38%
Spring	10%

Analysis of Top 10 Days per Year – Number of Exceedances

As the previous section showed, the top 10 monitored values were dominant during summer and winter, based on percentages. However, the percentages included many values below the standard. With this in mind, AQM analyzed the data based on the number of exceedance readings to see if the summer vs. winter relationships would change. DAQ assessed rolling three-year exceedances for 2006-2008, 2007-2009, 2008-2010 and finally all years (2006-2010).

When looking at the winter to summer relationships over the course of the years 2006 to 2008, summer exceedances dominate (79% summer: 11% winter), but becomes more in line with winter when looking at 2008-2010 data (42% summer: 41% winter). Figure 7-1 illustrates the winter vs. summer relationship over time (fall and spring are relatively insignificant and removed for contrast purposes).

Figure 7-1 Number of Winter vs. Summer Exceedances



In summary, exceedances of the daily $PM_{2.5}$ standard can and do occur in all four seasons of the year, with the summer and winter seasons dominating. Therefore, Delaware believes an annual inventory of emissions for the 2008 attainment year and future years adequately addresses emissions of PM2.5 and its precursors for purposes of maintaining the daily PM2.5 NAAQS. In support of this determination, PM control measures implemented by Delaware are effective throughout the calendar year.

7.3 2008 Attainment Year Inventory

The Delaware DAQ prepared a comprehensive emissions inventory for New Castle County (which represents Delaware's portion of the Philadelphia NAA), including point, area, and on-road and off-road mobile sources for primary $PM_{2.5}$ as well as precursors of $PM_{2.5}$ (NOx and SO_2) for the year 2008. EPA guidance requires the "attainment year" fall within the 3-year period (2008-2010) which demonstrates monitored attainment.

This inventory is based on actual activity levels and was developed in-house by the Delaware DAQ Inventory Group. Point source information was collected from Delaware industrial, commercial and institutional sources. Non-point (area) source emissions were calculated using the most recently available methodologies and emissions factors from EPA along with activity data (typically population, employment, fuel use, etc.) specific to 2008. On-road mobile source emissions were calculated using EPA's Motor Vehicle Emission Simulator (MOVES) model with 2008 vehicle miles traveled (VMT) data provided by the Delaware Department of Transportation (DelDOT). Off-road mobile source exhaust emissions, such as those from lawn and garden equipment, agricultural equipment, and construction equipment were calculated for 2008 using the EPA's NONROAD emissions model. Emissions sources such as commercial marine vessels, aircraft and locomotives (MAR) are not modeled by NONROAD and thus were calculated separately.

The details of the 2008 emissions inventory are presented in "*2008 Attainment Year State Implementation Plan Emissions Inventory for $PM_{2.5}$, SO_2, and NO_x"* provided in the supporting documentation. Table 7-3 summarizes the 2008 emissions estimates for New Castle County.

Table 7-3 2008 New Castle County Emissions (tpy)

2008			
Sector	**NOx**	**PM2.5**	**SO2**
Point	**5,589**	**1,109**	**10,576**
Non-point	**1,287**	**1,191**	**402**
On-road	**9,311**	**282**	**94**
Non-road	**4,317**	**312**	**1,067**
All Sectors	**20,504**	**2,894**	**12,139**

Note: sum of emissions may not match the total due to independent rounding.

8 Maintenance Demonstration

8.1 EPA Requirements

The 1992 EPA Calcagni Memo[14], entitled *Procedures for Processing Requests to Redesignate Areas to Attainment*, discusses how states may demonstrate maintenance of the NAAQS by showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory. The demonstration should be for a period of 10 years following the redesignation. The projected inventory should consider future growth, including population and industry. It should also be consistent with the attainment inventory, and it should document data inputs and assumptions. All elements of the demonstration should be consistent with current EPA guidance. Enforceability through regulations must also be demonstrated.

The Calcagni Memo goes on to say that any assumptions concerning emission rates must reflect permanent, enforceable measures. States generally cannot take credit for reductions unless there are regulations in place requiring those reductions or the reductions are otherwise shown to be permanent. Therefore, states are expected to maintain the implemented control strategy despite redesignation to attainment, unless such measures are shown to be unnecessary for maintenance or are replaced with measures that achieve equivalent reductions. Emission reductions from source shutdowns can be considered permanent and enforceable to the extent that those shutdowns have been reflected in the SIP and all applicable permits have been modified accordingly.

8.2 Delaware Approach

A Maintenance Plan must contain a demonstration that the level of emissions projected for the ten-year period following redesignation is sufficient to maintain the NAAQS. Because Delaware is submitting this Plan in 2012, and EPA has a maximum of 18 months to approve it, the EPA approval date for redesignation is expected to be before 2015, and ten (10) years after that is 2025. Accordingly, the State of Delaware projected 2008 $PM_{2.5}$, NOx, and SO_2 emissions for the Delaware portion of the Philadelphia NAA for 2025 to represent the end year of the maintenance plan. Delaware also projected emissions to 2017 to represent an interim year during the maintenance period. Emissions for the 2017 and 2025 projection years are compared to emissions levels in 2008 to determine if emissions are sufficient to maintain the NAAQS during this period (i.e. they must be lower than 2008).

8.2.1 2017 and 2025 Projection Inventories

New Castle County point and area source emissions for 2017 and 2025 were estimated using the 2008 attainment inventory and growth/control factors appropriate for each source category. DAQ adjusted the 2007 future year growth factors to a 2008 base year by using the same methodologies as those found in the *Technical Support Document for the Development of the 2025 Emission Inventory for $PM_{2.5}$ Nonattainment Counties in the MANE-VU Region,*

[14] http://www.epa.gov/ttn/oarpg/t5/memoranda/redesignmem090492.pdf

January 2012 (MARAMA 2025 TSD). For 2017 emission projections, the emission methodologies and growth factors can be found in the *Technical Support Document for the Development of the 2013/2017/2020 Emission Inventories for Regional Air Quality Modeling in the Northeast/Mid-Atlantic Region* (MARAMA 2017 TSD). The following Delaware-adjusted growth factor methods were applied per sector.

Commercial Marine, Aircraft and Railroad Projections

- Aircraft
    - Per MARAMA 2025 TSD, airport/airplane growth factors are based upon 2009 FAA Terminal Area Forecast (TAF) data.
    - The 2009 FAA TAF data is sorted for New Castle County data, using the same criteria as used by MARAMA.
    - Growth factors for 2017 and 2025 were calculated by dividing the projection year flight data by 2008 base year data.
- Rail & Commercial Marine
    - Per MARAMA TSD, rail and marine growth factors are based upon Table 7 "Transportation Sector Key Indicators and Delivered Energy Consumption" of the AEO 2010 data for energy consumption.
    - Growth factors for 2017 and 2025 were calculated by dividing the projection year energy use data by 2008 base year data.

EGU Projections

- Per MARAMA TSD, EGU growth factors are based upon 2011 AEO electricity generation data, by various regions.
- For Delaware, it was determined that the best data to use was from the Reliability First Corporation / East (RFCE) region.
- Growth factors for 2017 and 2025 were calculated by dividing the amount of electricity generated in the projection years by 2008 base year data.

Non-EGU Projections

- Non-EGU growth factors are based solely on Delaware employment data.
- The Delaware Department of Labor provided employment data, by NAICS from 2007 through 2018.
- Following guidance by the MARAMA TSD, Delaware employment data was calculated for 2019 through 2025.
- Growth factors for 2017 and 2025 were calculated by dividing the number of employees, by NAICS, in the projection years by 2008 base year data.

Area Projections

- If original growth factors for projecting 2007 emissions to 2017 and 2025 are 1.0, the growth factors for projecting 2008 emissions are kept as 1.0.

    - Fuel Combustion

        - Per MARAMA TSD, growth factors for area source fuel combustion categories are based upon 2010 AEO energy consumption data, by various regions.
        - For Delaware it was determined that the best data to use was for the South Atlantic Region.
        - Growth factors for 2017 and 2025 were calculated by dividing the energy consumption in the projection years by the 2008 base year data.
        - Industrial Fuel Combustion – Natural Gas
            - Per MARAMA TSD, one exemption to using 2010 AEO energy consumption data was when there was a difference of greater than 1% between the energy consumption data of 2010 and 2011.
            - Since there was such a difference in the natural gas consumption data for natural gas in 2011, the 2011 AEO data was determined to be the best data for Delaware for Industrial Fuel Combustion of natural gas.
            - Growth factors for 2017 and 2025 were calculated by dividing the energy consumption in the projection years by the 2008 base year data.

- Residential Wood Combustion

    - Per MARAMA TSD, residential wood combustion growth factors are based upon EPA emission projection parameters.
    - Growth factors for 2017 and 2025 were calculated by inserting the appropriate base year (BYR) and future (i.e., projection) year (FYR) into the EPA developed equations of (Formula=1 + 0.01*(FYR - BYR)), (Formula=1 - 0.02*(FYR - BYR)), or (Formula=1 + 0.02*(FYR - BYR)), depending on the equipment type.

- Residential Fuel Combustion – Kerosene

    - Per MARAMA TSD, growth factors for residential fuel combustion equipment using kerosene are based upon 2010 AEO energy consumption data, by various regions.
    - For Delaware it was determined that the best data to use was for the South Atlantic Region.
    - Growth factors for 2017 and 2025 were calculated by dividing the energy consumption in the projection years by the 2008 base year data.

- Paved Roads

    - Per MARAMA 2025 TSD, growth factors for paved roads are based upon county specific VMT used in MOVES.
    - Growth factors for 2017 and 2025 were calculated by dividing the VMT of the projection years by the VMT of the 2008 base year.

- Commercial Cooking

    - The Delaware Department of Labor provided employment data, by NAICS from 2007 through 2018.
    - Following guidance by the MARAMA 2025 TSD, Delaware employment data was calculated for 2019 through 2025.
    - Growth factors for 2017 and 2025 were calculated by dividing the number of employees, by NAICS, in the projection years by 2008 base year data.

- Construction

    - The Delaware Department of Labor provided employment data, by NAICS from 2007 through 2018.
    - Following guidance by the MARAMA TSD, Delaware employment data was calculated for 2019 through 2025.
    - Growth factors for 2017 and 2025 were calculated by dividing the number of employees, by NAICS, in the projection years by 2008 base year data.

NMIM/NONROAD Growth and Control Information

In estimating future year emissions, the EPA NMIM/NONROAD model includes growth and scrappage rates for equipment in addition to a variety of control programs. It is not possible to separate out the future year emissions due to "growth only" or "control only" in a single run. That is, the model run provides a single future year estimate that is a "growth and control" scenario.

The growth data used in the NMIM/NONROAD model is documented in an EPA report.[15] The GROWTH packet of the NONROAD model cross-references each SCC to a growth indicator code. The indicator is an arbitrary code that identifies an actual predicted value such as human population or employment that is used to estimate the future year equipment population. The GROWTH packet also defines the scrappage curves used to estimate the future year model year distribution.

The NMIM/NONROAD model also accounts for all EPA emission standards for nonroad equipment. There are multiple standards that vary by equipment type, rated power, model year,

[15] U.S. Environmental Protection Agency. *Nonroad Engine Growth Estimates*, EPA-420/P-04-08, April 2004. Also available at: http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2004/420p04008.pdf

and pollutant. A summary of the nonroad equipment emission standards can be found in Section 4.3.2, *Control Programs Included in the NMIM/NONROAD Model.*

ONROAD

For mobile projections and mobile budget purposes, Delaware is using the 2012 mobile emissions from its $PM_{2.5}$ Attainment Demonstration Revision, submitted to EPA on May 3, 2012. Delaware used 2012 mobile emissions in lieu of projected mobile emissions because:

1) They are based on the most up-to-date mobile source assumptions available.

2) 2012 emission budgets are 33% and 35% less than the onroad NOx and $PM_{2.5}$, respectively, found in the 2008 attainment year. (see table 8-2 and 8-3)

3) Additional reductions are not necessary in the context of this maintenance plan.

The 2012 emission inventory modeling of the on-road mobile source sector was performed by WRA Associates LLP, Wilmington, Delaware, under contract to DelDOT with technical support from the Division of Air Quality (DAQ) staff. The on-road mobile sources cover all highway vehicles including passenger cars, light-duty trucks, sport utility vehicles, heavy-duty trucks, buses, and motorcycles, which travel on Delaware's roadways in 2012. Delaware Department of Transportation (DelDOT) staff provided the vehicle miles traveled (VMT) on Delaware's roadways. DAQ staff also evaluated all information concerning control measures that would be effective in 2012. With the vehicle mix data and control information, the EPA's MOVES model was used to generate monthly emissions for $PM_{2.5}$, NOx and SO_2. After QC/QA reviews and revision by DAQ staff the emission data were finalized, and included in the final inventory. The on-road mobile source controls for New Castle County in the input files for the 2012 MOVES model runs include the following:

1) Low enhanced I/M program of model years 1968 through 1995,
2) On-Board Diagnostic checks of model years 1996 and newer,
3) National Low Emission Vehicle program,
4) Tier 2 emission standards/low sulfur rule, and
5) Heavy Duty Diesel Rule/low sulfur rule.

Table 8-1 provides a comparison of emissions for the years 2008, 2017 and 2025. The table demonstrates that the level of emissions projected through the maintenance period are less than emissions estimated for the attainment year and are, therefore, sufficient to maintain the $PM_{2.5}$ NAAQS. Tables 8-2 through 8-4 show NOx, $PM_{2.5}$ and SO_2 reductions (tpy) between 2008 and 2017 and 2025. The tables also provide the percent reduction of NOx, $PM_{2.5}$ and SO_2 by sector for those same years. It is readily apparent from these tables that SO_2 and NOx emissions are expected to decrease significantly between 2008 and 2025 (i.e., 38% and 61% for NOx and SO_2, respectively). $PM_{2.5}$ decreases less significantly (14%), primarily due to increased road dust from increased VMT. Projected emissions of those pollutants for the mid-point year of 2017 are also significantly less than their respective emissions levels in

2008. Based on these emissions trends it is expected that air quality will continue to meet the $PM_{2.5}$ NAAQS throughout the maintenance period.

Table 8-1 Comparison of emissions for the years 2008, 2017 and 2025

Sector	NOx			PM25			SO2		
	2008	**2017**	**2025**	**2008**	**2017**	**2025**	**2008**	**2017**	**2025**
Area	1,287	1,299	1,297	1,191	1,247	1,327	402	336	286
Nonroad MAR	2,641	1,760	1,247	164	59	42	1,039	120	39
Nonroad-NMIM	1,676	997	837	148	106	103	28	2	3
Onroad MOVES	9,311	6,273	6,273	282	199	199	94	98	98
Point – EGU	2,185	1,629	1,707	396	410	427	7,122	2,017	2,161
Point - nonEGU	3,404	1,724	1,421	713	504	398	3,454	2,559	2,096
All Sectors	**20,504**	**13,682**	**12,782**	**2,894**	**2,524**	**2,497**	**12,139**	**5,132**	**4,683**

Table 8-2 Reductions and % Change of NOx emissions for the years 2008, 2017 and 2025

NOx				Reduction (tpy)	Change (%)	Reduction (tpy)	Change (%)
Sector	**2008**	**2017**	**2025**	**2008-2017**	**2008 to 2017**	**2008 to 2025**	**2008 to 2025**
Area	1,287	1,299	1,297	-12	0.9%	-10	0.8%
Nonroad MAR	2,641	1,760	1,247	881	-33.3%	1,394	-52.8%
Nonroad-NMIM	1,676	997	837	679	-40.5%	840	-50.1%
Onroad MOVES	9,311	6,273	6,273	3,038	-32.6%	3,038	-32.6%
Point - EGU	2,185	1,629	1,707	556	-25.4%	478	-21.9%
Point - nonEGU	3,404	1,724	1,421	1,680	-49.4%	1,983	-58.3%
Total tpy	**20,504**	**13,682**	**12,782**	**6,822**	**-33%**	**7,722**	**-38%**

Table 8-3 Reductions and % Change of $PM_{2.5}$ emissions for the years 2008, 2017 and 2025

PM25				Reduction (tpy)	Change (%)	Reduction (tpy)	Change (%)
Sector	**2008**	**2017**	**2025**	**2008-2017**	**2008 to 2017**	**2008 to 2025**	**2008 to 2025**
Area	1,191	1,247	1,327	-56	4.7%	-136	11.4%
Nonroad MAR	164	59	42	106	-64.3%	122	-74.3%
Nonroad-NMIM	148	106	103	42	-28.6%	45	-30.2%
Onroad MOVES	282	199	199	83	-29.4%	83	-29.4%
Point - EGU	396	410	427	-14	3.5%	-32	8.0%
Point - nonEGU	713	504	398	209	-29.3%	315	-44.1%
Total tpy	**2,894**	**2,524**	**2,497**	**370**	**-13%**	**396**	**-14%**

Table 8-4 Reductions and % Change of SO_2 emissions for the years 2008, 2017 and 2025

SO2				Reduction (tpy)	Change (%)	Reduction (tpy)	Change (%)
Sector	**2008**	**2017**	**2025**	**2008-2017**	**2008 to 2017**	**2008 to 2025**	**2008 to 2025**
Area	402	336	286	66	-16.5%	116	-28.8%
Nonroad MAR	1,039	120	39	919	-88.4%	1,000	-96.2%
Nonroad-NMIM	28	2	3	25	-91.0%	25	-88.4%
Onroad MOVES	94	98	98	-3	3.4%	-3	3.4%
Point - EGU	7,122	2,017	2,161	5,104	-71.7%	4,960	-69.7%
Point - nonEGU	3,454	2,559	2,096	895	-25.9%	1,358	-39.3%
Total tpy	**12,139**	**5,132**	**4,683**	**7,007**	**-58%**	**7,456**	**-61%**

8.2.2 2017 and 2025 Mobile Source Emissions Budgets

Transportation conformity is a way to ensure that federal funding and approval are given to those transportation activities that are consistent with air quality goals. Transportation activities should not worsen air quality or interfere with an area's continued compliance in regards to the 2006 $PM_{2.5}$ NAAQS. The federal transportation conformity rule is codified in 40 CFR Part 93, Subpart A, titled *Determining Conformity of Federal Actions to State or Federal*

Implementation Plans (transportation conformity rule). This rule applies to areas designated as nonattainment for one or more NAAQS or that have been redesignated to attainment with federally approved air quality maintenance plans. The responsible transportation planning entities for the New Castle County, Delaware portion of the Philadelphia 2006 $PM_{2.5}$ NAA is the Delaware Department of Transportation (DelDOT) and the Wilmington Area Planning Council (WILMAPCO). In the transportation conformity process, overall emissions estimates by analysis year that take into account future traffic activity and projects expected to be completed are compared to a base year, a no build scenario, or emission budgets. Emission budgets are used in this maintenance plan only if EPA has approved or found adequate emissions budgets that have been submitted as a SIP revision.

The purpose of this section is to describe and establish the New Castle County motor vehicle emissions budgets associated with the $PM_{2.5}$ Maintenance Plan SIP. Annual motor vehicle emissions budgets are being proposed for the final year of the Maintenance Plan, which is 2025. The Maintenance Plan also includes motor vehicle emissions budgets for the interim year 2017.

Delaware is proposing to establish mobile budgets for $PM_{2.5}$ and NOx.[16] Ammonia and volatile organic compounds (VOC) are precursors; however, they are not considered significant overall contributors to $PM_{2.5}$ air quality issues, as noted in the $PM_{2.5}$ implementation rule at 40 CFR 51.1002(c)(3). For other pollutants such as SO_2, the highway contribution to those emissions may be insignificant. In that case, the transportation conformity rule allows such pollutants and precursors to be exempt from conformity analysis under certain circumstances:

> 40 CFR 93.109 (k), *Areas with insignificant motor vehicle emissions*
>
> *Notwithstanding the other paragraphs in this section, an area is not required to satisfy regional emissions analysis for §93.118 and/or §93.119 for a given pollutant/precursor and NAAQS, if EPA finds through the adequacy or approval process that a SIP demonstrates that regional motor vehicle emissions are an insignificant contributor to the air quality problem for that pollutant/precursor and NAAQS. The SIP would have to demonstrate that it would be unreasonable to expect that such an area would experience enough motor vehicle emissions growth in that pollutant/precursor for a NAAQS violation to occur. Such a finding would be based on a number of factors, including the percentage of motor vehicle emissions in the context of the total SIP inventory, the current state of air quality as determined by monitoring data for that NAAQS, the absence of SIP motor vehicle control measures, and historical trends and future projections of the growth of motor vehicle emissions.*

Delaware is herein making a finding that highway emissions of SO_2 are insignificant contributors to the $PM_{2.5}$ air quality of the New Castle County portion of the Philadelphia NAA.

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16 As discussed in Delaware's 2008 Annual $PM_{2.5}$ Attainment Demonstration, and revised in Delaware's *Proposed Revision to Delaware's 2008 State Implementation Plan For Attainment of the $PM_{2.5}$ Annual National Ambient Air Quality Standard - Attainment Demonstration,* submitted to EPA May 3, 2012.

This finding is due to the fact that the SO_2 emissions inventory constitutes a very small fraction (less than 1.5 percent) of the overall SO_2 in the 2008, 2017 and 2025 emissions inventories. The finding will become final if EPA concurs and approves this maintenance plan.

A motor vehicle emissions budget is that portion of the total allowable emissions allocated to highway and transit vehicle use that are defined in the SIP for a certain year. The rules governing transportation conformity require certain transportation activities to be consistent with motor vehicle emissions budgets contained in control strategy implementation plans (40 CFR § 93.118). Section 93.101 of the rule defines a "control strategy [State] implementation plan revision" as a "plan which contains specific strategies for controlling the emissions and reducing ambient levels of pollutants in order to satisfy CAA requirements of reasonable further progress and attainment." In order to demonstrate conformity to the motor vehicle emissions budget, emissions from the implementation of a transportation plan or a transportation improvement program (TIP) must be less than or equal to the budget level (40 CFR § 93.118(a)).

Delaware's proposed 2012 NOx and $PM_{2.5}$ budgets in its *Proposed Revision to Delaware's 2008 State Implementation Plan for Attainment of the $PM_{2.5}$ Annual National Ambient Air Quality Standard - Attainment Demonstration* (submitted to EPA on May 3, 2012). These budgets represent a level of mobile emissions lower than what existed during the years attainment was reached (i.e., 2008-2010 and 2009-2011). Furthermore, because of significant reductions in other source categories, mobile reductions are not necessary to demonstrate maintenance (i.e., the 2025 NOx $PM_{2.5}$ and SO_2 emissions are well below 2008 levels), there is no need to develop new mobile budgets as this time.[17] Therefore, Delaware proposes to use existing 2012 budgets for the 2017 interim year, as well as the end year, 2025.[18]
Table 8-6 summarizes the budgets for each relevant year.

Table 8-5 New Castle County Mobile Source Emissions Budgets

Year	NO_X On-Road Emissions (tpy)	$PM_{2.5}$ On-Road Emissions (tpy)
2012 Attainment SIP Revision – Mobile Budgets	**6,273**	**199**
2017 Interim Budget	**6,273**	**199**
2025 Final Budget	**6,273**	**199**

[17] DAQ may require new budgets should the Philadelphia maintenance area lapse into nonattainment, (see Section 10).

[18] New Castle County has been designated as nonattainment under the new ozone NAAQS. Therefore, new and stricter budgets for NOx will be included in the ozone attainment demonstration and/or reasonable progress SIP(s). The stricter budgets will require mobile control measures and reduced VMT. Consequently, there will be a collateral benefit in the form of $PM_{2.5}$ reductions.

8.2.3 Control Measures for Maintenance of Good Air Quality

Point, area, non-road and on-road emission projections for 2017 and 2025 include a variety of control strategies that will reduce emissions of $PM_{2.5}$, NO_X, and SO_2 in the future years. The sections below describe the major control programs in each category. Many of these programs are federal programs that are enforced on a regional or national level. In cases where the programs are delegated programs or state programs, EPA has approved these programs into the Delaware SIP. The State of Delaware commits to the continuation of these programs, to include compliance and enforcement mechanisms as appropriate to ensure that reductions assumed in 2017 and 2025 will be achieved.

Tables 8-2 through 8-4 show that that projected 2008 to 2025 reductions are 7,722 tpy for NOx, 396 tpy for $PM_{2.5}$ and 7,456 tpy for SO_2. In terms of percent reductions, this equates to 38%, 14% and 61% reductions of NOx, $PM_{2.5}$ and SO_2, respectively. The same tables show projections from 2008 to the 2017 interim year. 2008-2017 reductions are 6,822 tpy for NOx, 370 tpy for $PM_{2.5}$ and 7,007 tpy for SO_2. In terms of percent reductions, this equates to 33%, 13% and 58% reductions of NOx, $PM_{2.5}$ and SO_2, respectively.

However, not all of these reductions are due to control measures. Projected emissions can be higher or lower due to growth factors alone, or in combination with controls (assuming controls exist for a certain source category). DAQ calculated reductions that will occur *after 2008* due only to control measures, (no growth), for EGUs, non-EGU point sources, area and "marine, aircraft and locomotive" (MAR) sources. Because onroad and non-MAR off-road sources are estimated using EPA models (MOVES and NMIM), and inherently include growth in the form of fleet turnover, equipment turnover, ex. lawnmowers, etc., it is not feasible to break out onroad and non-MAR off-road reductions due exclusively to controls.

Looking at Table 8-6, it is evident that all but the area source sectors had significant decreases for NOx (particularly onroad), SO_2 and/or $PM_{2.5}$ due to control measures.

Table 8-6 Post-2008 Emission Reductions due to Control Measures

2008-2025 Reductions due to controls only (no growth)			
	NOx	**PM2.5**	**SO2**
EGUs			
DE Admin Code 1146 (Multi-Pollutant Regulation)	953.4	3.5	5,171.1
nonEGU			
Delaware City Refinery NOx CAP (1650 tpy) post-2015	874.7	0.0	0.0
Reciprocating Internal Combustion Engines -	0.0	0.1	0.0
Maximum Achievable Control Technology			
(RICE MACT) (76 FR 12863)			
Chrysler Plant Shutdown	8.4	0.7	6.0
AREA			
2010 RICE MACT	42.5	0.3	0.3
EPA New Source Performance Standards for Woodstoves (NSPS). These standards are codified at 40 CFR part 60, subpart AAA. The final standards were promulgated in 1988 (53 FR 5860).	4.9	74.1	0.8
NMIN	840	45	25
ONROAD	3,038	83	-3
Marine Vessels, Aircraft and Locomotives (MAR)			
Control of Emissions of Air Pollution From Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder; Republication; Final Rule. (73 FR 37096)	**862.3**	**32.9**	**150.1**
Control of Emissions From New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder(75 FR 22895)	**597.3**	**90.7**	**850.7**
TOTALS	**7,221**	**330**	**6,200**

8.2.4 Delaware-specific NOx, PM2.5 or SO2 Control Measures (Effective Post 2008)

- 7 DE Admin. Code 1146, EGUs, Electric Generating Unit (EGU) Multi-Pollutant Regulation, SO_2 and NO_X emission control, State-wide, Effective December 2006[19], approved into Delaware's SIP August 28, 2008 (73 FR 50723), March 16, 2010 (75 FR 12449), and August 11, 2010 (75 FR 48566).

- 7 DE Admin. Code 1142, Section 2, Control of NO_X Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries, NO_X emission control, New Castle County, Effective July 2007; approved into Delaware's SIP June 4, 2010 (75 FR 31711) and August 11, 2010 (75 FR 48566); revisions approved May 15, 2012 (77 FR 28489).

- 7 DE Admin. Code 1148, Control of Stationary Combustion Turbine Electric Generating Unit Emissions, approved into Delaware's SIP on November 10, 2008 (73 FR 66554) and August 11, 2010 (75 FR 48566).

EGU reductions

EGUs are a subset of point source emissions and include the following New Castle County facilities:

- Conectiv Delmarva Generation-Del City
- Conectiv Delmarva Generation-West Substation
- Conectiv Delmarva Generation-Edge Moor
- Conectiv Delmarva Generation-Christiana
- Conectiv Delmarva Generation-Hay Road

Edge Moor is the only New Castle EGU which burned coal and residual oil in 2008. The rest fired natural gas or distillate oil, and thus had insignificant $PM_{2.5}$ and SO_2 emissions in 2008 and are projected to have insignificant emissions in $PM_{2.5}$ and SO2 emissions in 2025. In 2008, total EGU emissions of NOx, $PM_{2.5}$ and SO_2 were 2,185 tpy, 396 tpy and 7122 tpy, respectively. Of this amount, Edge Moor's NOx, $PM_{2.5}$ and SO_2 emissions were 1,980 tpy, 360 tpy and 7,110 tpy, respectively. Consequently, Edge Moor was the largest EGU emitter, e.g. its 2008 emissions represented 99% of NOx, $PM_{2.5}$ and SO_2, respectively for all New Castle County EGUs. Because Units 3 and 4 were coal-fired in 2008, and Unit 5 operates primarily on residual oil, it is subject to 7 DE Admin Code 1146, which is Delaware's EGU Multi-pollutant Regulation. 7 DE Admin Code 1146 is a non-trading program/regulation that was established primarily as a measure to aid in the attainment of the ozone and fine particulate matter ambient air quality standards. As Tables 8-2 through 8-4 show, 7 DE Admin Code 1146 will reduce EGU emissions in 2025 by 22% for NOx, and 70% for SO_2. $PM_{2.5}$ emission controls are not part

[19] Although effective in 2006, NOx controls were not required until January 1, 2009 and SO_2 controls were not required until January 1, 2012.

of Regulation 1146, but there were some co-benefits by requiring 0.5% by weight low-sulfur residual oil on Unit 5, which will yield 8% reductions.

Non-EGU reductions

Delaware Source Shutdowns (post-2008)

The Chrysler automotive plant ceased commercial operation in January, 2009. However, only a 25% reduction was applied, since Chrysler maintains 50% of the emission credits and Delaware Economic Development Office retains the remaining 25%. Reductions are shown in Table 8-7.

Delaware On-road

In additional to the federal Tier 1 and 2 program, NLEV, and the federal 2007 heavy duty highway rule, Delaware has instituted *Enhanced Vehicle Emissions Inspection And Maintenance* (enhanced I/M) requirements in New Castle County. The requirements involve mandating regional vehicle emission I/M programs that are stricter than basic programs, as required under §§182 and 202 of the CAA. Before 1994, basic automobile emissions testing checked only tailpipe emissions while idling and sometimes at 2,500 rpm. Enhanced I/M procedures include the use of On Board Diagnostic (OBD) system evaluations, a wider range of vehicles tested, and may include a dynamometer (treadmill) test that checks the car's emissions under driving conditions. The OBD evaluations provide a more complete inspection, checking for excess evaporative emissions and other issues that might affect emissions from the vehicle. Delaware's enhanced I/M program was approved into the Delaware SIP by EPA on September 30, 1999 (64 FR 52657). Revisions to the enhanced I/M program were approved by EPA on 11/26/2003 (68 FR 228).

8.2.5 Federal Control Measures (Effective or Phased-in Post 2008)

Because federal control measures that are either effective or phased in after 2008 are the same as those discussed in Section 4.3.2, please refer to that Section. Note that the Woodstove NSPS and many of the non-road and on-road federal control measures have effective dates prior to, during, or after 2008. However, other than fuel standards; all of the measures are phased in over many years through fleet or equipment "turnover." For example, in the case of non-road sources, fleet turnover includes sales of new engines replacing older ones over the years. Therefore, it is expected that reductions will continue well past the 2008 attainment year.

8.2.6 Future Point Source Emissions Reductions Programs

Delaware

New Delaware regulations and federally enforceable permit changes will reduce emissions of NOx, $PM_{2.5}$ and SO_2 even further, although these rules are not yet finalized and therefore were not considered in the 2017 and 2025 estimates included in this document. Under development are:

- Low-sulfur distillate and residual fuel regulation
- Calpine - Edge Moor Power Plant (fuel switch from coal to natural gas)

Federal

Three new federal regulations will reduce emissions of SO_2 even further, although these rules are not yet finalized and therefore were not considered in the 2017 and 2025 estimates included in this document. If these regulations are finalized, each should instigate significant further reductions, both within and outside the Philadelphia NAA.

- Mercury and Air Toxics Rule: On March 16, 2011, EPA proposed the Mercury and Air Toxics Rule to reduce emissions of toxic air pollutants from new and existing coal and oil-fired EGUs. The proposed rule would establish numerical emission limits for hydrogen chloride (HCl) as a surrogate for toxic acid gases, or alternative standards for SO_2. EPA estimates that this rule would affect approximately 1,200 coal-fired units nationwide and would reduce SO_2 emissions from power plants by 55%. The final rule is expected to be published in 2012 so that existing sources may be required to demonstrate compliance with applicable standards by 2015. National Emission Standards for Hazardous Air Pollutants From Coal and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, Final Rule published February 16, 2012 (77 FR 9304); Correction published April 19, 2012 (77 FR 23399).[20]

- 2010 SO_2 NAAQS: On June 2, 2010, EPA strengthened the primary NAAQS for SO_2 by revising the primary SO_2 standard to 75 ppb averaged over one hour. This short term standard is significantly more stringent than the revoked standards of 140 ppb averaged over 24 hours and 30 ppb averaged over a year. Under the new standard's proposed guidance, facilities emitting more than 100 tpy of SO_2, many of which are EGUs, will be required to demonstrate compliance with the standard no later than 2017.

- Industrial/Commercial/Institutional (ICI) Boiler Maximum Achievable Control Technology (MACT) Standard: EPA finalized the revised ICI Boiler MACT on February 21, 2011, although portions of the rule are under reconsideration. EPA estimates that implementation of the revised rulemaking will reduce emissions nationwide from major source boilers and process heaters by 47,000 tpy of PM, 440,000 tpy of SO_2, and 7,000 tpy of VOCs.

- Tier 4 Standards: On May 11, 2004, the EPA signed the final rule introducing Tier 4 emission standards, which are to be phased-in over the period of 2008-2015 *[69 FR 38957-39273, 29 Jun 2004]*. The Tier 4 standards require that emissions of PM and NOx be further reduced by about 90%. Such emission reductions will be achieved through the

[20] This rule is under reconsideration. EPA expects to complete ruling-making in March, 2013 (July 20, 2012 letter from Gina Mcarthy, EPA Administrator, to Patricia T. Barmeyer).

use of control technologies—including advanced exhaust gas after-treatment.

8.2.7 Controls to Remain in Effect

Delaware will maintain all of the control measures listed in this Section to ensure maintenance of the daily $PM_{2.5}$ NAAQS. Any revisions to the control measures included as part of the Maintenance Plan will be submitted as a SIP revision to EPA for approval, and will be accompanied by a showing that such changes will not interfere with maintenance of the NAAQS. The Delaware DAQ has the necessary resources to enforce any violations of its rules or permit provisions. After redesignation, it intends to continue enforcing all rules that relate to the emissions of primary $PM_{2.5}$ and precursors to secondary $PM_{2.5}$ which may impact New Castle County ambient PM2.5 concentrations.

Although Delaware believes that control of organic compounds and ammonia may help improve PM air quality, we have not relied on the control of organics or ammonia, consistent with the $PM_{2.5}$ Implementation Rule.

9 Verify Continued Attainment

9.1 EPA Requirements

States must ensure that they have the legal authority to implement and enforce all measures necessary to attain and maintain the NAAQS. Sections 110(a)(2)(B) and (F) of the CAA suggest that one such measure is the acquisition of air quality and source emission data to demonstrate attainment and maintenance.

9.2 Delaware Approach

The State of Delaware has the legal authority to implement and enforce specified measures necessary to attain and maintain the 2006 daily PM2.5 NAAQS. Delaware concludes that, as EPA has stated in previous rulemaking,[21] only the Section 110 and Part D requirements that are linked with a particular area's designation are the relevant measures which Delaware must consider in evaluating a redesignation request. Further, DAQ believes that the other Section 110 elements that are not connected with nonattainment plan submissions and not linked with an area's attainment status are also not applicable requirements for purposes of redesignation. A state remains subject to these requirements after an area is redesignated to attainment.

The requirements of Section 110(a)(2) are statewide requirements that are not linked to the $PM_{2.5}$ nonattainment status of the Philadelphia NAA. Therefore, Delaware believes that these SIP elements are not applicable requirements for purposes of review of the state's $PM_{2.5}$ redesignation request.

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21 See EPA's proposed approval of Ohio's redesignation request for the Ohio portion of the Huntington-Ashland nonattainment area for the 1997 $PM_{2.5}$ NAAQS. (76 FR 79593)

In addition to maintaining key elements of its regulatory program in place in Delaware's SIP, Delaware will acquire ambient monitoring and source emission data to track attainment and maintenance as described in Sections 3 and 7. Delaware will also track the progress of the maintenance demonstration by periodically updating the emissions inventory as required by the Air Emissions Reporting Requirements Rule, or as required by federal regulation during the maintenance plan period. This includes developing annual inventories for major point sources and a comprehensive periodic inventory covering all source categories every three years. Tracking will include the evaluation of annual and periodic evaluations for any significant emission increases above the 2008 attainment year levels.

10 Contingency Measures

10.1 EPA Requirements

Section 175(A) of the CAA specifies the requirements for Maintenance Plans, including provisions for contingency measures[22] that will be implemented if violations of the 2006 daily $PM_{2.5}$ NAAQS are measured after redesignation to attainment. A list of potential contingency measures that would be implemented in such an event should also be included in the Maintenance Plan. Finally, the plan should provide a commitment to submit a revised Maintenance Plan eight years after redesignation to ensure continued maintenance for the next ten-year maintenance period.

Contingency measures are intended to provide further emissions reductions in the event that violations of the 2006 daily $PM_{2.5}$ NAAQS occur after redesignation to attainment. While these measures do not need to be fully adopted by the State of Delaware prior to the occurrence of NAAQS violations, the contingency plan should ensure that the contingency measures are adopted expeditiously once they are triggered. The Maintenance Plan must identify the triggers that determine when contingency measures will be adopted, and the measures that the state will consider. It should also include a schedule and procedures for adoption and implementation, and a specific time limit for action. Specific triggers that would put the plan into motion must be identified. This plan is considered to be an enforceable part of the SIP and should ensure that the contingency measures are adopted explicitly once they are triggered.

10.2 Delaware Approach

Consistent with this plan, Delaware agrees to adopt and implement the necessary corrective actions in the event that violations of the 2006 daily $PM_{2.5}$ NAAQS occur within the Philadelphia maintenance area after its redesignation to attainment.[23] As described in Section 5

[22] CAA Section 107(d)(3)(E)(v).

[23] NJ, DE and PA are each submitting their own redesignation requests and maintenance plans. After each State's Plans are approved by EPA, the Philadelphia NAA will be re-defined as the Philadelphia *Maintenance* Area, It is also possible that a portion of the area may be redesignated to attainment (i.e., a maintenance area) and a portion may still be nonattainment. Therefore, for the purposes of this maintenance plan, the "Philadelphia Maintenance Area" also includes any areas of the Philadelphia NAA that have not been redesignated to attainment.

of this report, EPA and Delaware have adopted and are continuing to implement a range of control measures that will greatly reduce precursor emissions - locally, statewide and nationwide. Delaware commits to continue to implement the identified statewide and local control measures. The Delaware DAQ anticipates that post-2008 emissions reductions will be sufficient to mitigate exceedances or violations of the daily $PM_{2.5}$ NAAQS that may occur in the coming years without further regulatory action. However, in the event of a future violation or exceedance of the daily PM2.5 NAAQS, the Delaware DAQ will use the following triggers (determination of when to start an action) and perform the following actions in accordance with the described schedule, as its contingency plan:

1. Warning Level Response (one or both of the following events occur)

    a. A warning level response shall be prompted whenever the 98th percentile 24-hour $PM_{2.5}$ concentration of 35.5 $\mu g/m^3$ or greater occurs in a single calendar year within the Philadelphia maintenance area.

    b. The New Castle County, Delaware maintenance area total $PM_{2.5}$, NOx and SO_2 emissions increase more than 10% above the levels in the 2008 attainment year emissions inventory.

2. Action Level Response

An action level response shall be prompted whenever a two-year average of the 98th percentile 24-hour $PM_{2.5}$ concentration of 35.5 $\mu g/m^3$ or greater occurs within the Philadelphia maintenance area. A violation of the standard (three-year average of the 98th percentile of 35.5 $\mu g/m^3$ or greater), shall also prompt an action level response.

3. Study and data analysis

In order to select appropriate corrective measures for warning or action level triggers, the Delaware DAQ will work independently, or in conjunction with the States of Pennsylvania and New Jersey, and the City of Philadelphia to conduct a comprehensive study to determine the causes of the violation and the control measures necessary to mitigate the problem. This analysis may include all or some of the following factors as necessary, to determine the cause of the exceedance, emissions increase or violation:

- The location and severity of the ambient $PM_{2.5}$ exceedances;
- The weather patterns contributing to the elevated $PM_{2.5}$ levels;
- Potential contributing emissions sources;
- The geographic applicability of possible contingency measures;
- Emissions trends, including timeliness of implementation of scheduled control measures;
- Current and recently identified control technologies;
- Air quality contributions from outside the maintenance area;

- Activity data for relevant sources;
- Information on any unusual events (e.g. forest fires, natural disasters), transport from out of state sources;
- Violation of an existing rule or permit, and;
- Any other related data to try to determine the cause of the violation.

The study will evaluate whether the trend, if any, is likely to continue and if so, the control measures necessary to reverse the trend taking into consideration ease and timing for implementation as well as economic and social considerations. In the event that the trigger is not found to be due to an exceptional event, malfunction, or noncompliance with a permit condition or rule requirement, Delaware DAQ will work with the States of Pennsylvania and New Jersey, and the City of Philadelphia as necessary, to determine additional control measures needed to assure future attainment of the 2006 daily, $PM_{2.5}$ NAAQS.

Based on the results of the analysis, contingency measures will be selected from those listed below, or from any other measure deemed appropriate and effective at the time the selection is made. *However, if a new measure or control is already promulgated and scheduled to be implemented at the federal or state level at such time after the exceedance, and that measure or control is determined to be sufficient to address the upward trend in air quality, additional local measures may be unnecessary*. It is expected that implementation of only a few of these measures would be necessary. The selection between measures will be based upon cost-effectiveness, emissions reduction potential, ease and timing of implementation, and other appropriate factors.

Adoption of additional control measures is subject to necessary administrative and legal processes. The Delaware DAQ will solicit input from all interested and affected persons in the area prior to selecting appropriate control measures. No contingency measure shall be implemented without providing the opportunity for full public participation during which the relative costs and benefits of individual measures, at the time they are under consideration, can be fully evaluated. This process will include publication of notices, an opportunity for public hearing, and other measures required by Delaware law.

4. Timing of contingency measure implementation

A timeline for the development of NO_X, $PM_{2.5}$ and/or SO_2 regulations or permit conditions follows. This schedule initiates with certification of ambient air quality monitoring data indicating a violation of the daily $PM_{2.5}$ NAAQS:

a. Warning Level Response

Should a warning level response be triggered, measures that can be implemented in a short time will be selected in order to be in place within 18 months from the close of the calendar year that prompted the warning level.

b. Action Level Response

Should an action level response be triggered, implementation of necessary control measures will take place as expeditiously as possible, but in no event later than 18 months after the Delaware DAQ makes a determination, based on quality-assured ambient data, that a violation of the NAAQS has occurred.

Table 10-1 Schedule for Permit Revisions or Rule Revisions for Contingency Measures[24]

Identify and quantify the emissions reductions expected to result in the future from existing and future state and federal regulatory programs.	3 months
Use the best available air quality modeling to evaluate the air quality improvement expected to result in the Philadelphia MA from the programs and emissions reductions identified in step 5 below.	6 months
Draft any needed permit conditions or SIP regulations.	3 months
Complete rulemaking or permit revision process and submit to EPA.	6 months
Completion no later than	**18 months**

5. List of Potential Contingency Measures

- Lower particulate limits for No. 6 fuel oil-fired boilers.
- Working with the local metropolitan planning agencies to implement transportation control measures such as: traffic flow improvements, transit improvements, trip reduction programs, arterial and signal improvement projects, bicycle projects, or other new transportation measures.
- Low-sulfur distillate and residual fuels.
- Additional $PM_{2.5}$ controls for EGUs and large industrial boilers burning fuels other than distillate fuel or natural gas.
- Calpine Edge Moor power plant – Units 3 and 4 fuel switch from coal to natural gas.
- Vehicle inspection and maintenance program enhancements (increase weight limit, addition of diesel vehicles, etc.).
- Alternative fuel and additional diesel retrofit programs for fleet vehicle operations.
- Require NOx or SO_2 emission offsets for new and modified major sources.
- Increase the ratio of emission offsets required for new sources.

24 This schedule initiates with certification of ambient air quality monitoring data indicating a violation of the 2006 24-hour $PM_{2.5}$ NAAQS.

- Require NOx or SO_2 controls on new minor sources (less than 100 tons).
- Require increased recovery efficiency at sulfur recovery plants.
- Broader geographic applicability of existing measures.

11 Other Delaware Commitments

11.1 Commitment to Revise Plan

Delaware DAQ commits to submit a second 10-year Maintenance Plan eight years after redesignation, as required by Section 175(A)(b) of the CAA. The Maintenance Plan revision is intended to ensure continued attainment of the 2006 daily $PM_{2.5}$ NAAQS for an additional ten-year period.

11.2 Public Participation

In accordance with Section 110(a)(2) of the CAA, Delaware is required to have a public comment period and provide the opportunity for a public hearing on the Maintenance Plan prior to adoption. Public participation in the Delaware SIP process is required by Delaware law[25] as follows:

- Notice of availability of the SIP document and the time and date of the public hearing are published as a Legal Notice in the News Journal and Delaware State News, 30 days prior to the hearing, and is submitted along with this redesignation request and maintenance plan
- A public hearing is required for all Delaware State Implementation Plans and Regulations, and was held on October 23, 2012.
- A 30-day public comment period is open before the public hearing to receive comments on the Maintenance Plan. A summary of any comments received and Delaware DAQ's responses is included with this SIP submittal to the EPA.
- The Legal Notices, Comments and other documentation as required by EPA and Delaware Law and DNREC policies will also be submitted to the EPA.

[25] TITLE 29, General Regulations for State Agencies, Chapter 101, Administrative Procedures Subchapter II, Agency Regulations.

12 CONCLUSIONS

The Philadelphia nonattainment area has attained the 2006 daily $PM_{2.5}$ NAAQS and has complied with the applicable provisions of the CAA required of the $PM_{2.5}$ NAAQS. Delaware demonstrated that the Philadelphia NAA has attained the 2006 daily $PM_{2.5}$ NAAQS and that the air quality improvements are due to permanent and enforceable control measures.

The Delaware DAQ has prepared a Maintenance Plan that meets the requirement of 175A of the Clean Air Act. This Maintenance Plan provides for the continued attainment of the 2006 daily $PM_{2.5}$ NAAQS for a period of at least ten years after EPA has formally redesignated the area to attainment. This Maintenance Plan provides adequate contingency measures for potential, additional emissions reductions in the event that future violations of the 2006 daily $PM_{2.5}$ NAAQS are observed in the area.

Delaware has performed an analysis that shows the air quality improvements are due to permanent and enforceable measures and that additional significant regional NOx and SO_2 reductions following implementation of federal and state measures will ensure continued compliance (maintenance) with the standard. Furthermore, emission projections in the Maintenance Plan indicate that NOx, $PM_{2.5}$ and SO_2 emissions will continue to decline, ensuring that the area continues to maintain compliance with the standard and provide for an increased margin of safety.

The Delaware DAQ has prepared a comprehensive emissions inventory of $PM_{2.5}$ and its precursors for the "attainment" year, (2008), and has prepared projections of the emissions inventory to 2017 and 2025. These emissions projections indicate that emissions levels in the New Castle portion of the Philadelphia NAA will continue to remain much lower than emissions from the attainment year 2008 levels, thereby maintaining the $PM_{2.5}$ NAAQS in future years.[26] The Delaware DAQ commits to continue to operate an appropriate air quality monitoring network to verify the maintenance of the attainment status once the area has been redesignated. The Delaware DAQ has the legal authority to implement and enforce all control measures.

The Delaware DAQ has prepared a comprehensive emissions inventory of $PM_{2.5}$ and its precursors for the "base year" year, 2007 to meet CAA 172(c)(3) requirements.

Finally, the Delaware $PM_{2.5}$ Maintenance Plan includes year 2017 and 2025 on-road motor vehicle emissions budgets for $PM_{2.5}$ and NOx for use in transportation conformity determinations to assure that any increases in emissions from this sector do not jeopardize continued attainment of the 2006 daily $PM_{2.5}$ NAAQS standard during the ten-year maintenance period. Delaware's Maintenance Plan has been prepared in accordance with the requirements specified in EPA's guidance document, and additional guidance received from EPA staff.

Based on this presentation, New Castle County, Delaware meets the requirements for redesignation under the CAA (Section 107(d)(3)) and EPA guidance for fine particles.

[26] Based on MARAMA work, and consultation with PA and NJ, emissions for all of the Philadelphia NAA will decrease significantly by 2017 and 2025.

Consistent with the authority granted to EPA, the State of Delaware requests that New Castle County, Delaware be redesignated to attainment for the 2006 daily fine particles standard simultaneously with EPA approval of this Delaware State redesignation request and daily $PM_{2.5}$ Maintenance Plan for the New Castle County portion of the Philadelphia NAA.